# EtherLink® 10/100 PCI Network Interface Card with 3XP Processor User Guide

**3CR990-TX-95**
**3CR990-TX-97**
**3CR990SVR95**
**3CR990SVR97**

**10/100 Mbps PCI client and server network interface cards with Dynamic*Access*® technology**

**http://www.3com.com/**
**http://www.3com.com/productreg**

Part No. 09-1742-001
Published May 2000

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**About This Guide**

This guide describes how to install, configure, and troubleshoot the 3Com EtherLink 10/100 Mbps PCI network interface card (NIC) with 3XP Processor, which is available in the following models:

| | |
|---|---|
| 3CR990-TX-95 | Client NIC for 56-bit encryption |
| 3CR990-TX-97 | Client NIC for 56-bit and 168-bit encryption |
| 3CR990SVR95 | Server NIC for 56-bit encryption |
| 3CR990SVR97 | Server NIC for 56-bit and 168-bit encryption |

This guide is intended for the network administrator, network operator, or network hardware installer. Knowledge of Ethernet and the server network operating system is required.

Documentation is available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the 3Com World Wide Web site: http://www.3com.com/. You can download Acrobat Reader from the Adobe Systems Incorporated web site: http://www.adobe.com/.

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# ABOUT THIS GUIDE

This guide describes how to install, configure, and troubleshoot the following 3Com® EtherLink® PCI network interface cards (NICs):

| NIC/Description | Model Number |
|---|---|
| EtherLink 10/100 Mbps PCI with 3XP Processor<br>Client NIC for DES (56-bit) encryption | 3CR990-TX-95 |
| EtherLink 10/100 Mbps PCI with 3XP Processor<br>Client NIC for 3DES (168-bit) and DES (56-bit) encryption | 3CR990-TX-97 |
| EtherLink Server 10/100 Mbps PCI NIC with 3XP Processor<br>Server NIC for DES (56-bit) encryption | 3CR990SVR95 |
| EtherLink 10/100 Mbps PCI server NIC with 3XP Processor<br>Server NIC for 3DES (168-bit) and DES (56-bit) encryption | 3CR990SVR97 |

This guide is intended for those who install and configure Ethernet NICs. Some familiarity with Ethernet networks and NICs is assumed.

*If release notes are shipped with your product and the information there differs from the information in this guide, follow the instructions in the release notes.*

Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the 3Com World Wide Web site:

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You can download Acrobat Reader from the *EtherCD* or from Adobe Systems Incorporated Web site:

**http://www.3com.com/**

## Conventions

The following tables list conventions that are used throughout this guide.

| Icon | Notice Type | Description |
|---|---|---|
| | Information note | Information that describes important features or instructions |
| | Caution | Information that alerts you to potential loss of data or potential damage to an application, system, or device |
| | Warning | Information that alerts you to potential personal injury |

| Convention | Description |
|---|---|
| `Screen displays` | This typeface represents information as it appears on the screen. |
| **`Commands`** | The word "command" means that you must enter the command exactly as shown and then press Return or Enter. Commands appear in bold. Example:<br>To launch the DOS diagnostics program, enter the following command:<br>**`a: install`** |
| The words "enter" and "type" | When you see the word "enter" in this guide, you must type something, and then press Return or Enter. Do not press Return or Enter when an instruction simply says "type." |
| Words in *italics* | Italics are used to:<br>■ Emphasize a point.<br>■ Denote a new term at the place where it is defined in the text.<br>■ Identify menu names, menu commands, and software button names. Examples:<br>From the *Help* menu, select *Contents*.<br>Click *OK*. |

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# 1 INTRODUCTION

## Overview

This chapter describes the following 3Com® EtherLink® 10/100 Mbps PCI network interface card (NIC) models from the 3CR990 NIC family.

| Product Name/Description | Model Number |
|---|---|
| EtherLink 10/100 Mbps PCI with 3XP Processor<br>Client NIC for DES (56-bit) encryption | 3CR990-TX-95 |
| EtherLink 10/100 Mbps PCI with 3XP Processor<br>Client NIC for 3DES (168-bit) and DES (56-bit) encryption | 3CR990-TX-97 |
| EtherLink Server 10/100 Mbps PCI NIC with 3XP Processor<br>Server NIC for DES (56-bit) encryption | 3CR990SVR95 |
| EtherLink 10/100 Mbps PCI server NIC with 3XP Processor<br>Server NIC for 3DES (168-bit) and DES (56-bit) encryption | 3CR990SVR97 |

*Unless specifically indicated, information in this user guide refers to all 3CR990 NIC models.*

The 3CR990 NIC connects your PCI-compliant PC to a 10 Mbps or 100 Mbps Ethernet network. It provides advanced features for high performance and secure transactions. High performance is achieved through an onboard RISC processor; secure transactions are achieved through data encryption.

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## Onboard 3XP Processor

The 3CR990 NIC represents a new generation of secure, intelligent client NICs with an onboard RISC processor (3XP processor). The 3XP processor is designed to optimize system and network performance. The NIC off-loads key networking and security tasks from the host PC CPU (central processing unit) to the 3XP processor, even when running bandwidth-intensive applications such as voice, video, imaging, and Internet and intranet applications.

## Data Encryption

The 3CR990 NIC provides DES (Data Encryption Standard 56-bit) encryption and 3DES (triple-DES 168-bit) encryption. Encryption processing is handled entirely by the 3XP processor and the encryption chip that resides on the NIC.

The onboard encryption chip enables true end-to-end network security (IPSec) at the data capacity of the connected network cable (wire speed), without sacrificing performance.

### LAN Encryption Software for Windows 95/98

3Com Dynamic*Access*® LAN Encryption software is available on the *EtherCD* packaged with your NIC. The LAN Encryption utility secures communication for individual computers by ensuring authentication, encryption, and data integrity. It intercepts incoming and outgoing communication and encrypts it, blocks it from passing, or lets it through without encryption.

Dynamic*Access* LAN Encryption software supports both DES (56-bit) and 3DES (168-bit) encryption. For detailed information on Dynamic*Access* LAN Encryption, see the Dynamic*Access LAN Encryption Software Administrator's Guide*, located with the Dynamic*Access* LAN Encryption software on the 3Com *EtherCD*. (For installation instructions, see Installing DynamicAccess LAN Encryption Software on page 76.)

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### High Encryption Pack for Windows 2000

The Windows 2000 High Encryption Pack allows you to enhance your system with the highest available encryption level (168-bit). You can download the High Encryption Pack from the following Microsoft World Wide Web site:

http://www.microsoft.com/WINDOWS2000/downloads/recommended/encryption/default.asp

*The Windows 2000 High Encryption Pack is eligible for export from the U.S. to all customers worldwide, except to U.S. embargoed destinations. Please see http://www.microsoft.com/exporting/ for details. Other countries may exercise separate jurisdiction over the import, export or use of encryption products. Users who download this product should observe any local regulations that may apply to the distribution or use of encryption products.*

## 3CR990 NIC Features

Parallel Tasking® II hardware technology plus a powerful suite of Dynamic*Access* technology software features relieve network congestion and ensure high performance and maximum bandwidth availability.

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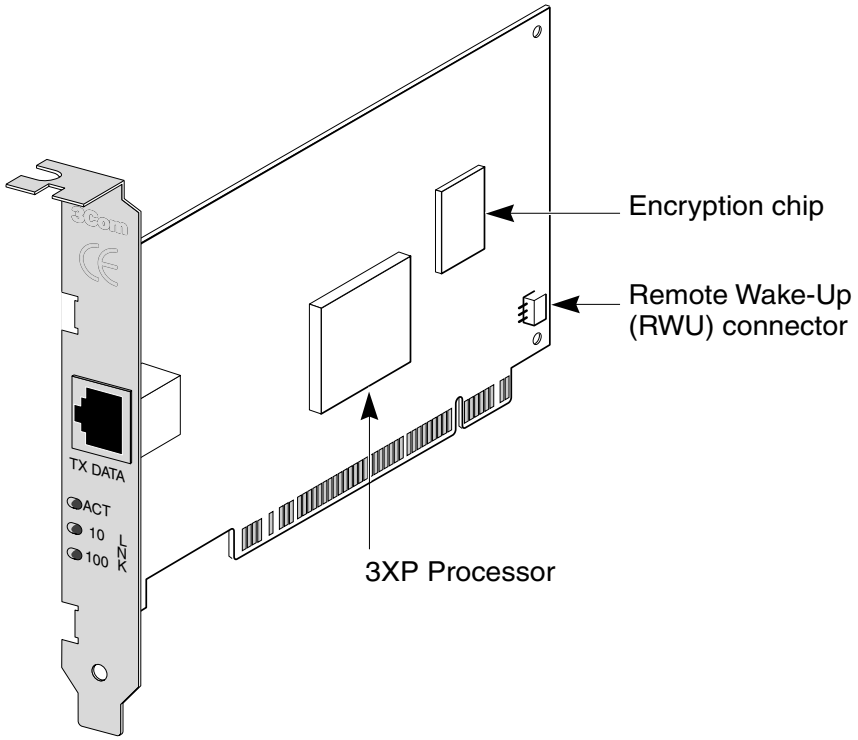
**Figure 1** The 3CR990 NIC Supports Up to 168-bit (3DES) Encryption




The 3CR990 NIC provides these features for supported IP and IPX environments:

- Advanced Server Features (for 3CR990 server NICs only)—Improved network performance, management, and control:
  - Load Balancing
  - Self-Healing Drivers
  - Failover
  - VLANs
  - Traffic Prioritization
- Remote Wake-Up—Lets you power-on a computer remotely for after-hours administration.
- Integrated Boot ROM with Managed PC Boot Agent (MBA)—Adds management capabilities by enabling the computer to boot from another computer, rather than from its local drive.
- Desktop Management Interface (DMI) 2.0—Enables managed computers and net computers to report details about themselves and their peripheral devices

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across the network to a DMI 2.0-compliant management application.

- Remote System Alerts (heartbeat packets)—Can signal a possible computer power loss or theft.
- Hot Plug NIC Installation—Lets you add a new NIC or remove and replace a NIC without turning off power to the computer.
- Offline Diagnostics—Provides offline diagnostics programs for configuring, testing, and troubleshooting NICs.

## Advanced Server Features

3Com Dynamic*Access* technology advanced network software adds intelligence to the NIC to improve network performance, management, and control. Dynamic*Access* server features relieve network congestion and ensure high performance and maximum bandwidth availability.

- Load Balancing groups share the network load over resilient server links (RSLs) that keep traffic flowing even if a NIC in a group is temporarily disconnected.
- Self-Healing Drivers (SHDs) detect common error conditions and correct them while maintaining server link performance.
- Failover fault tolerance provides a backup solution in the event of a NIC failure.
- VLANs (IEEE 802.1Q multiple virtual LANs) let you divide network segments into logical partitions that simplify configuration changes, organize work groups efficiently, help to control traffic, and provide extra security.
- Traffic Prioritization (IEEE 802.1p/Q) ensures that business-critical and delay-sensitive traffic (such as multimedia applications) has priority over normal data.

  For detailed information on Dynamic*Access* technology products, go to:

  http://www.3com.com/dynamicaccess

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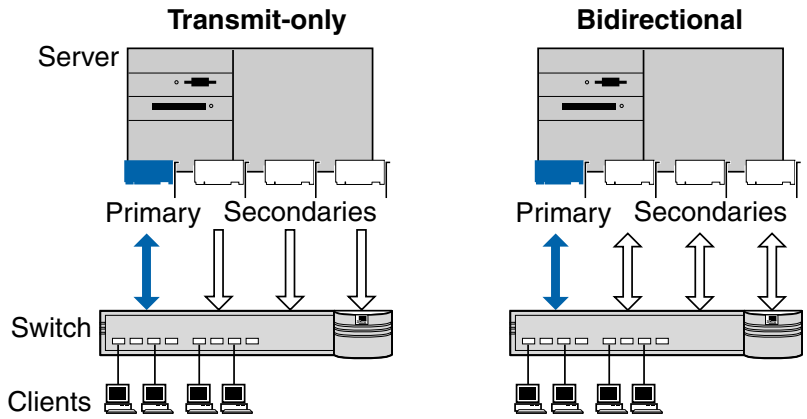
## Load Balancing

Load balancing maximizes bandwidth at the server through the use of multiple parallel resilient server links (RSLs) that share the network load.

An RSL consists of two or more NICs that form a *virtual NIC*. Each virtual NIC has multiple physical NICs bound to it, forming a *group*. Each NIC in a group uses the same protocols and frame types. One NIC is designated the *primary* NIC and the others *secondary* NICs.

**Figure 2** Types of Load Balancing Arrangements




## Self-Healing Drivers

Self-healing drivers (SHDs) are automatically installed with the NIC software, and work together with RSLs to maintain the network connection. An SHD monitors the NIC continuously for error conditions and makes corrections. These corrections can include resetting the NIC, rebuilding software data structures, temporarily disabling features, or transferring all network traffic to secondary NICs (termed a *failover event*). An SHD can also continuously monitor the status of the physical NICs in a virtual NIC group before and after failover. Errors and actions are reported to the system console and to the system log file. Error threshold values can be configured at any time.

## Failover

In addition to load balancing, RSLs provide failover fault tolerance between a server and a switch—if one NIC in a group fails, the others assume the network load of the

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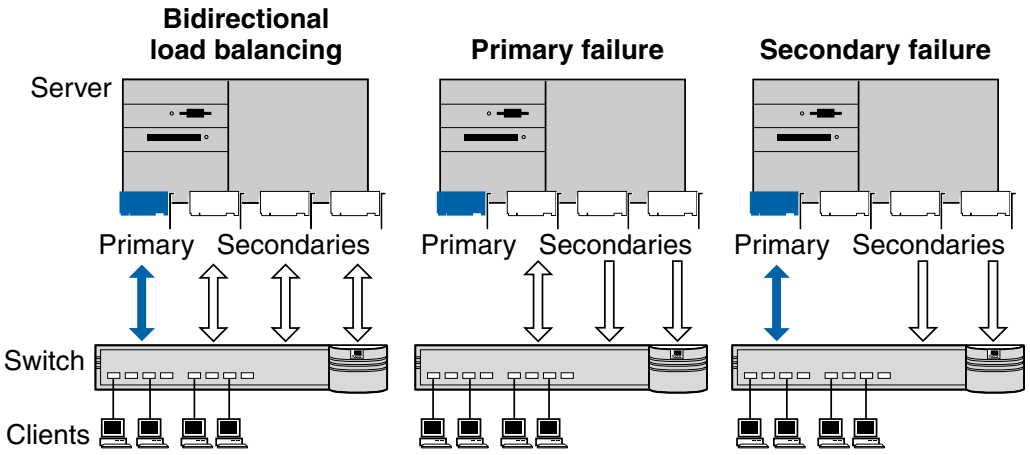
failed NIC. The failover behavior of secondary NICs depends on how you set load balancing:

- In a *transmit* load balancing arrangement, the primary NIC is the only one that receives packets. If the primary NIC fails, a secondary NIC assumes the configuration profile, network traffic, and active status of the failed primary NIC.
- In a *bidirectional* load balancing arrangement, all NICs receive packets. If any NIC fails, receive load balancing is disabled, and the other NICs continue transmit-only load balancing activity. Receive load balancing is restored when new connections are established with clients.

If any NIC in a bidirectional arrangement fails, receive load balancing is disabled, and the other NICs continue transmit-only load balancing activity. If the primary NIC fails, a secondary NIC takes over packet reception for the group.

Bidirectional load balancing is restored after a failure when applications create new connections and new clients log in.

**Figure 3** Bidirectional Load Balancing Failover




## VLANs

A VLAN is a group of location-independent and topology-independent devices that communicate as if they were on the same physical LAN. Network devices on different LAN segments and of different media types can

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be members of the same VLAN. Membership in a VLAN is determined by a VLAN tag that is transmitted with the Ethernet frame for use by a switch.

With VLANs, you can define a network according to:

- Organizational groups—For example, you can have one VLAN for the Marketing department and one for the Finance department.
- Application groups—For example, you can have one VLAN for e-mail users and one for multimedia users.

Implementing VLANs on a network has these advantages:

- It eases the change and movement of devices on IP networks.

  With traditional IP networks, if users move to a different IP subnet, the IP addresses of each workstation must be updated manually. With VLANs installed, if an end station on VLAN 1 is moved to a port elsewhere on the network, you need only to specify that the new port is on VLAN 1.
- It helps to control traffic.

  With traditional networks, congestion can be caused by broadcast traffic that is directed to all network devices whether they require it or not. Each VLAN can be set up to contain only those devices that need to communicate with each other, increasing network efficiency.
- It provides extra security.

  Devices within each VLAN can communicate only with member devices in the same VLAN. If a device in VLAN 1 needs to communicate with devices in VLAN 2, the traffic must cross a router.

The Dynamic*Access* technology multiple VLAN capability supports IEEE 802.1Q VLAN tagging and works with any switch that complies with IEEE 802.1Q specifications. See your Ethernet switch documentation for more information on IEEE 802.1Q VLANs.

### Traffic Prioritization

Traffic prioritization (IEEE 802.1p/Q) ensures that business-critical and delay-sensitive traffic (such as multimedia applications) has priority over normal data.

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For detailed information on Dynamic*Access* technology products, go to:

http://www.3com.com/dynamicaccess

## Server Features Using Other NICs

One *foreign NIC* (one that is not a 3Com EtherLink Server NIC) is allowed in one group per server. For guidelines on using foreign NICs, see these topics:

- **Windows NT and Windows 2000**—Planning the Configuration on page 60
- **NetWare**—Planning the Configuration on page 104

## Remote Wake-Up

Remote Wake-Up provides the ability to remotely power-on a network computer for after-hours administration. When the PC is in sleep mode and receives a wake-up packet (Magic Packet frame) through the LAN, the NIC turns on the power to the PC. Remote Wake-Up also requires using a desktop management application that is able to generate a Magic Packet Remote Wake-Up signal.

If the computer complies with PCI 2.2, Remote Wake-Up is automatically enabled through the PCI bus. If the computer complies with PCI 2.1, Remote Wake-Up support is enabled by connecting a Remote Wake-Up cable from the NIC's Remote Wake-Up (RWU) connector to a 3-pin Remote Wake-Up connector on the computer motherboard.

*The NIC provides a network connection with or without the Remote Wake-Up cable installed.*

### Remote Wake-Up Requirements

The following conditions are required to use Remote Wake-Up:

- Management application that supports Remote Wake-Up
- BIOS that supports Remote Wake-Up

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- PCI 2.2-compliant bus or a 3-pin Remote Wake-Up connector on the computer motherboard and a 5-volt standby power supply unit rated at a minimum of 375 milliamperes

If you are unsure whether your computer meets the requirements listed above, see the computer documentation or contact the computer manufacturer.

For more information on Remote Wake-Up, including a list of computers that currently support this feature, go to:

http://www.3com.com/partners/acpi

### Remote Wake-Up Cable

To order Remote Wake-Up cables, contact 3Com:

- Toll-free number for the United States and Canada:
  1-877-226-4604
- Toll number for international calls:
  - From the European Community: 001-510-226-4604
  - From other countries: Enter the international access code followed by 510-226-4604

### Remote Wake-Up and Multiple NIC Installations

To use multiple NICs as Remote Wake-Up NICs in the same computer, the computer must have a power supply that can support multiple Remote Wake-Up devices.

See your computer documentation if you are unsure whether your computer power supply can accommodate more than one Remote Wake-Up device.

## Integrated Boot ROM with Managed PC Boot Agent (MBA)

The Managed PC Boot Agent (MBA) software adds management capabilities to the NIC by enabling the computer to boot from a network server, rather than from the computer's local drive.

This preboot support allows you to use management applications to perform the following tasks remotely:

- Install and configure a new computer that has never been connected to the network.
- Upgrade software.

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- Configure or reconfigure multiple systems simultaneously.
- Scan for viruses.
- Back-up hard drives and perform disaster recovery tasks.

In addition to firmware, MBA has a complete set of tools, utilities, and pre-OS software that enables network administrators to perform such tasks as:

- Reconfiguring multiple systems at once.
- Backing up hard drives automatically.

For information on configuring the MBA to boot from the network, see Configuring the Managed PC Boot Agent (MBA) on page 120.

For detailed information on the MBA, see the *Managed PC Boot Agent User Guide*, located with the MBA software on the 3Com *EtherCD*.

For more information on the management features supported by the NIC, go to:

http://www.3com.com/managedpc

## Desktop Management Interface (DMI) 2.0

Desktop Management Interface (DMI) is a network management standard that is widely accepted for managing Intel-based computers.

DMI 2.0 enables managed computers and net computers to report details about themselves and their peripheral devices across the network to a DMI 2.0-compliant management application.

The 3Com DMI Agent allows any DMI management application to access information such as:

- the NIC driver location, version, and size
- packets-sent statistics
- crc receive errors

A network administrator can then use this type of information to remotely configure and manage a client or server computer.

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The 3Com DMI Agent consists of a DMI browser with the following components:

- DMI service layer
- DMI agent
- GUI installer
- NDIS drivers

### DHCP Server Prevention

This feature prevents the PC from acting like a DHCP server. All receive packets are passed through a DHCP filter and are discarded if they are deemed to be destined for the DHCP process.

## Remote System Alerts

The NIC can be configured to continuously transmit a packet to an alert target management station. If the management station fails to receive the regularly scheduled packet, an alert can be triggered that signals a possible computer power loss or theft.

The NIC can also transmit a workgroup keep-alive packet periodically while the computer is in a sleep state. This packet prevents the computer's workstation address from being aged-out of switch router tables.

*Only system administrators should configure these features.*

## Hot Plug NIC Installation

If your computer supports PCI hot plug specifications, you can add a new 3Com NIC or remove and replace a 3Com NIC without turning off power to the computer. Hot plug NIC installation allows you to expand connections without taking the computer out of service. It makes troubleshooting faster and easier because you do not need to wait for the computer to reboot.

For instructions on performing a hot plug NIC installation, refer to your computer documentation.

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### Offline Diagnostics

The NIC software includes offline diagnostics programs for configuring, testing, and troubleshooting NICs. The configuration program within the DOS diagnostics program is used for a PC running DOS or NetWare. The 3Com NIC diagnostics program (3Com NIC Doctor) is a windows-based program used for a PC running Windows 2000, Windows NT 4.0, Windows 98, or Windows 95.

## DynamicAccess LAN Agent

The Dynamic*Access* LAN agent is advanced network software that improves performance, management, and control of your network.

The Dynamic*Access* LAN agent enables the following features:

- RMON SmartAgents—Enables full RMON reporting on all network segments, including switched networks, without the need to place dedicated RMON probes throughout the network. RMON SmartAgents are for use with the Dynamic*Access* network edge monitor or other remote monitoring applications.
- Traffic prioritization (IEEE 802.1p/Q)—Ensures that business-critical and delay-sensitive traffic (such as multimedia applications) has priority over normal data.
- Fast IP—Eliminates router bottlenecks and improves performance in switched networks.
- Efficient multicast control—Prevents flooding of switched networks by multicast applications such as video training, stock quotes, or online news.

The Dynamic*Access* LAN agent can be installed on a PC running Windows 2000, Windows NT, Windows 98, or Windows 95. See Installing the DynamicAccess LAN Agent for a Client NIC on page 55 for more information.

For detailed information on the Dynamic*Access* LAN agent, see the *Dynamic*Access *Technology User Guide* located on the *EtherCD*. Information is also available at:

`http://www.3com.com/dynamicaccess`

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## Windows 2000 Offload Features

Additionally, the 3CR990 NIC supports Windows 2000 offload features in an IP environment. The Windows 2000 offload features are designed to enhance the Windows 2000 operating system capabilities by off loading key TCP/IP networking and security tasks from the Windows 2000 operating system:

- IPSec Offload—reduces CPU utilization by allowing the 3XP processor and a crypto chip on the NIC to perform data encryption operations.
- TCP Segmentation Offload—reduces CPU utilization by allowing the 3XP processor on the NIC to perform segmentation of TCP packets.

*Windows 2000 does not allow IPSec offloads and TCP Segmentation offloads for the same session. Though all offload types may be enabled, TCP Segmentation offloading will not occur during an IPSec session.*

- IP and TCP Checksum Offload—reduced CPU utilization by allowing the 3XP processor on the NIC to perform the checksum calculation of TCP/IP and UDP/IP packets.
- 802.1P Packet Priority Offload—reduces CPU utilization by allowing the 3XP processor on the NIC to perform the insertion of the 802.1Q tag header into the packet.

For more information on enabling and disabling offloads for Windows 2000, see Using Windows 2000 Offload Features on page 73.

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# 2 INSTALLING AND CONNECTING THE NIC

## Overview

This chapter describes how to install the NIC in your PC and connect it to an Ethernet or Fast Ethernet network.

### Installation Overview

There are four steps to the NIC installation:

1. **Register the product.**
2. **Install the NIC in the PC.**
3. **Connect the NIC to the network.**
4. **Install the network driver.**

### Safety Precautions

Observe the following safety precautions.

***WARNING:*** *Computers operate with voltages that can be lethal. Before removing the cover, turn off the computer and unplug it. Disconnect all cables that are connected to the main system unit. Remove jewelry from your hands and wrists. Use insulated or nonconductive tools.*

***CAUTION:*** *The NIC is packed in an antistatic container to protect it during shipment. Do not touch the components or any metal parts on the NIC, except for the backplate. To avoid damaging the NIC or the computer, reduce static electricity on your body by wearing an electrostatic discharge wrist strap attached to the chassis or by touching an unpainted metal part of the chassis before unplugging the computer and before handling the NIC.*

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***CAUTION:*** *Install the NIC in a PCI slot that conforms to PCI 2.1 or higher specifications. Do not attempt to install the NIC in an ISA or EISA slot. Doing so may damage the NIC and the computer.*

***WARNING:*** *Make sure that the computer power cord is unplugged. Only properly trained and authorized personnel should perform service. Contact the computer manufacturer for information about safe service techniques.*

## Installation Requirements

The following items are required for hardware and software installation.

- **Network Interface Card (NIC)**—At least one 3Com 10/100 Mbps PCI 3CR990 NIC (included)
- **Processor**:
  - Server: Intel-based CPU (Pentium-class processor)
  - Client: 80486 or Pentium-class processor
- **RAM**:
  - Server: 128 megabytes minimum; 256 megabytes recommended
  - Client: 32 MB RAM recommended for running Dynamic*Access* Technology
- **PCI slot**—For each NIC, one bus master slot that conforms to PCI 32-bit specifications, revision 2.1 or higher
- **Drive**—CD-ROM
- **Cable**—Category 5 UTP (included). (See cable specifications in Preparing the NIC and the Computer on page 32.)
- **Connector**—RJ-45 (included)
- **Software**—One 3Com *EtherCD* with Dynamic*Access* technology software and network drivers (included)
- **Operating system**—One of the following:
  - Microsoft Windows 2000
  - Microsoft Windows NT version 4.0
  - Microsoft Windows 95/98

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*You can install the NIC base network driver on any Windows PC without having to also install a specific Microsoft Service Pack; however, 3Com recommends that you always try to use the most recent Service Pack available from Microsoft technical support (www.microsoft.com).*

*Running 3Com* Dynamic*Access software on NetWare 4.0 requires Service Pack 6 or greater from Microsoft.*

- Novell NetWare server version 3.12, 4.11, or 5.0 with the most recent patches and updates available from Novell technical support (www.novell.com)
- **Computer BIOS**—Latest version. Contact the computer manufacturer to verify.

**Remote Wake-Up**—For requirements, see Remote Wake-Up on page 21.

### Installing Multiple NICs

If you are installing multiple EtherLink PCI NICs in a computer, follow the instructions in Installing Multiple NICs on page 52.

### Upgrading Windows 95 to Windows 98

If you are upgrading a computer from Windows 95 to Windows 98, and the computer already has an EtherLink PCI NIC installed, follow the instructions in the WIN98.TXT file located in the HELP directory on the *EtherCD*.

### Updating the Network Driver and NIC Software

If you already have an EtherLink PCI NIC installed and want to update the network driver, follow the instructions in Updating the Network Driver and NIC Software on page 51.

## Installing From Diskette

If your computer does not have a CD-ROM drive, use a PC that has a CD-ROM drive and create installation diskettes from the *EtherCD*.

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You can also download the *EtherCD* software from the 3Com World Wide Web site:

http://support.3com.com/infodeli/tools/nic

*The installation diskettes allow you to install the network driver only. If you want to install the NIC diagnostics or desktop management software, you must install them from the EtherCD.*

## Making a DOS-Bootable Diskette

For installation and configuration procedures that require you to boot from DOS, you cannot successfully use the MS-DOS prompt from within Windows. Perform a "clean" boot from DOS or use a DOS boot disk.

*To use the CD-ROM drive on a PC or server in a DOS environment, the DOS drivers for the CD-ROM drive must be installed. Consult the documentation that accompanied your CD-ROM drive or your motherboard for information about how to install these drivers.*

*If the PC or server is only running DOS and a CD-ROM drive is not installed, you must install the NIC software using installation diskettes. For more information about installation diskettes, see the next section, Creating Installation Diskettes.*

To make a DOS-bootable diskette:

1. **Insert a blank, formatted diskette in drive A.**
2. **At the DOS prompt, enter:**

   ```
   sys a:
   ```

   System files are copied to the diskette.
3. **Remove the diskette from drive A and attach a label for future reference.**

   Label the diskettes *EtherDisk 1* and *EtherDisk 2*.

## Creating Installation Diskettes

To create installation diskettes from the *EtherCD*:

1. **Turn on the power to the PC and start Windows.**
2. **Insert the *EtherCD* in the CD-ROM drive.**

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The *EtherCD* Welcome screen appears.

3 **Click *NIC Software*.**

4 **Click *NIC Drivers and Diagnostics*.**

5 **Click *Installation Utilities*.**

6 **Click *Create Installation Diskettes.***

The *EtherCD* Diskette Creation Utility Welcome screen appears.

7 **Click *Next*.**

8 **Insert the blank, formatted diskette labeled *EtherDisk 1* in the PC, and then click *Next*.**

Files are copied. *EtherDisk 1* contains:

- NDIS 2/3/4/5 drivers
- DOS utilities
- README.TXT file

9 **Remove the disk and insert the disk labeled *EtherDisk 2* when prompted, and then click *OK*.**

Files are copied. *EtherDisk 2* contains:

- NetWare client and server drivers
- PACKET driver
- Help text files

The diskette creation is complete.

*For instructions on using the installation diskettes to install the network driver, see the DISKETTE.PDF file in the ENGLISH\MANUALS\ETHERDSK directory on the EtherCD.*

## Product Registration

The United States government places registration requirements on using data encryption products. To obtain customer support for the 3CR990 NIC, you are required to register your NIC product with 3Com. You can register electronically or by U.S. mail.

In addition to enabling customer support for your NIC, registration also entitles you to receive upgrade information and advance feature information.

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*To be able to register electronically, a web browser must be installed on your system. You must also have an active Internet service provider (ISP) connection.*

*The original version of Windows 95 (Build 950) does not automatically allow you to change your default browser, even if Microsoft Internet Explorer is not present. If you are running this version of Windows 95 on your PC, access the following site to register your 3CR990 NIC:*

`http://www.3com.com/productreg`

To register electronically:

1 **Insert the *EtherCD* (that shipped with this product) in the CD-ROM drive.**

The *EtherCD* Welcome screen appears.

If the Welcome screen does not appear, see EtherCD Content and Navigation on page 163.

2 **Click *Register Product*, and then *Register Online*.**

3 **Follow the prompts as they appear.**

To register by U.S. mail:

1 **Find and remove the registration card included in the *EtherLink 10/100 PCI Network Interface Card Quick Guide* that shipped with this product.**

Fill out the registration card and drop it in the mail. (No postage is required.)

## Preparing the NIC and the Computer

Observe the precautions listed in Safety Precautions on page 27. Follow these preparation steps:

1 **Decide whether you want to use Remote Wake-Up.**

If you want to use the Remote Wake-Up feature on a computer that complies with PCI 2.1, you must obtain a Remote Wake-Up cable for the NIC (for details, see Remote Wake-Up on page 21). If the computer complies with PCI 2.2, Remote Wake-Up is automatically enabled through the PCI bus and no Remote Wake-Up cable is required.

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**2 Make sure that cable requirements are met.**

The RJ-45 port provides a 10 Mbps or 100 Mbps connection automatically, depending on the speed of the connected hub or switch.

The following table shows the cable requirements and maximum network cable lengths for the RJ-45 port.

| Network Environment | Cable Required | Maximum Cable Length |
|---|---|---|
| 10 Mbps (10BASE-T) | Category 3, 4, or 5 unshielded twisted-pair | 100 m (328 ft) |
| 100 Mbps (100BASE-TX) | Category 5 unshielded twisted-pair | 100 m (328 ft) |

**3 Unpack and inspect the NIC for damage.**

**4 Exit all open applications and user processes.**

**5 Turn off the power to the computer and attached devices.**

**6 Unplug the power cables from the power source.**

**7 Remove the computer cover.**

**8 Locate an empty, nonshared bus-mastering PCI slot and remove its slot cover. Save the screw, if there is one.**

Do not install the NIC in a shared PCI slot. Avoid any PCI slot next to an ISA slot. This is often a shared slot and does not support bus mastering.

If you do not know how to identify a PCI slot, check the computer documentation or ask the system administrator.

If you are planning to install the Remote Wake-Up cable, choose an empty PCI slot that is close to the Remote Wake-Up connector on the computer motherboard. The Remote Wake-Up cable is only required if the computer complies with PCI 2.1 and you want to use the Remote Wake-Up. The cable is not required if the computer complies with PCI 2.2. (For information on obtaining a Remote Wake-Up cable from 3Com, see Remote Wake-Up Cable on page 22.)

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**9 Write down the MAC address of the NIC and note the relative position of the intended PCI slot.**

This information is helpful when you are installing the network drivers and connecting the cables to the hub or switch. The MAC address is the 12-digit hexadecimal number printed on the small bar code label on the component side of the NIC.

The next step is to install the NIC in the computer and connect it to the network.

## Installing and Connecting the NIC

Observe the safety precautions listed in Safety Precautions on page 27.

Prepare the NIC and the computer as described in Preparing the NIC and the Computer on page 32.

The following instructions apply to installing the NIC in most computers. If these instructions are not appropriate for your computer, refer to the documentation that accompanied the computer.

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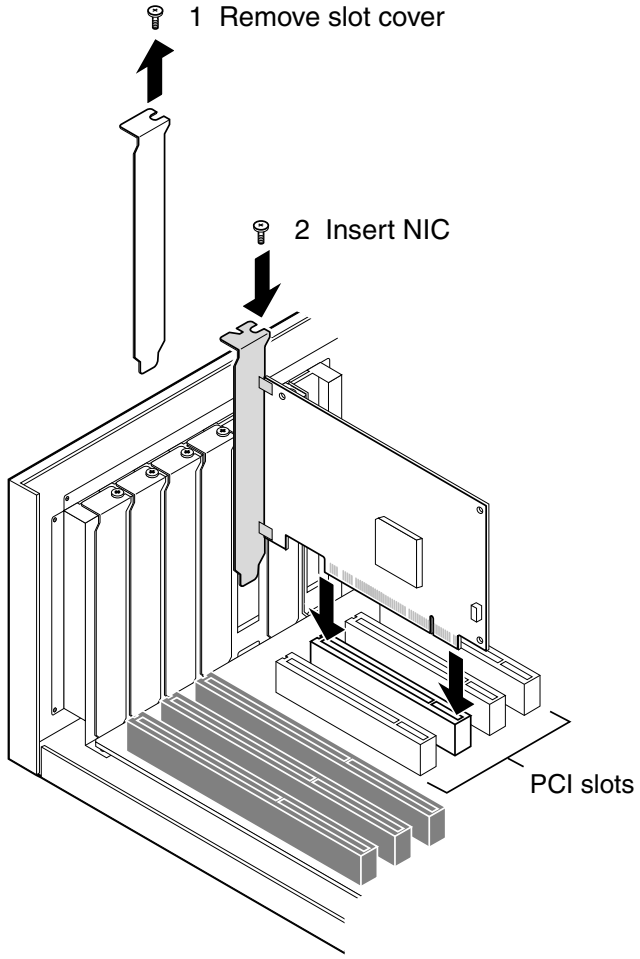
**Figure 4** Installing the NIC




**1 Carefully insert the NIC in the empty PCI slot, as shown.**

Press firmly to ensure that the NIC is fully seated in the slot. Secure the NIC with the screw if you removed one earlier.

*If you want to install the Remote Wake-Up cable, go to the next section, Connecting the Remote Wake-Up Cable to continue the installation. If you do not want to connect the cable, continue with step 2.*

**2 Replace the computer cover and plug in the power cord.**

Do not turn on the power to the computer.

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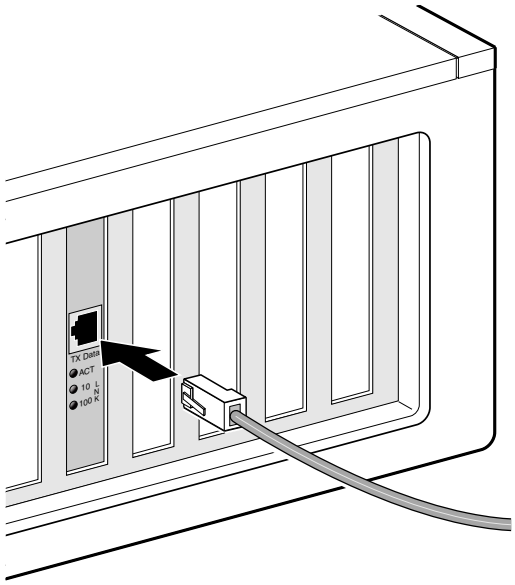
3 **Plug the RJ-45 connector on the twisted-pair network cable into the RJ-45 port on the NIC backplate.**

4 **Connect the other end of the network cable to an active network port.**

**Figure 5** Connecting the cable to the NIC backplate




The next step is to install the software, as described in Installing Software on page 38.

*If your site network installation procedures require you to verify that installed hardware is functional before you install software, run the 3CR990.EXE DOS diagnostics program before installing the driver. This program is located on the 3Com EtherCD.*

## Connecting the Remote Wake-Up Cable

This section describes how to connect the Remote Wake-Up cable from the NIC to the PC motherboard. Connecting the Remote Wake-Up cable is optional. Connect this cable only if your NIC supports Remote Wake-Up and you want to use this feature. (For information on obtaining a Remote Wake-Up cable from 3Com, see Remote Wake-Up Cable on page 22.)

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***WARNING:*** *Make sure that the PC power cord is unplugged. Only properly trained and authorized personnel should perform service. Contact your PC manufacturer for information about safe service techniques.*

To connect the Remote Wake-Up cable:

1 **Make sure that the NIC is properly installed in a PCI slot.**

2 **Insert the Remote Wake-Up cable into the RWU connector on the NIC.**

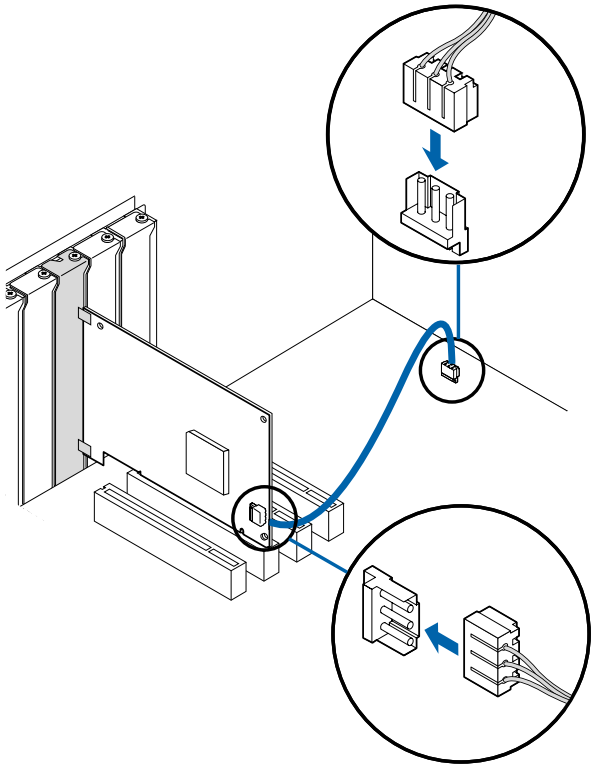
Twist the cable twice before attaching the cable to the PC.

3 **Attach the other end of the cable to the connector on the PC motherboard.**

Refer to your PC documentation if you need help locating the connector.

4 **Replace the PC cover and plug in the power cord.**

Do not turn on the power to the PC. Continue at step 3 in Installing and Connecting the NIC.



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## Installing Software

See the following topics for requirements and instructions on installing software in various operating systems:

- Installing NIC Drivers in Windows on page 39
- Updating the Network Driver and NIC Software on page 51
- Installing NetWare Client and Server Drivers on page 89

The next step is to install the network driver.

Go to Installing NIC Drivers in Windows on page 39 or Installing NetWare Client and Server Drivers on page 89.

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# 3 INSTALLING NIC DRIVERS IN WINDOWS

## Overview

This chapter explains the following tasks on a computer running Windows 2000, Windows NT, Windows 98, or Windows 95:

- Install the network driver and NIC software using *EtherCD*
- Update the network driver or NIC diagnostics program
- Install multiple NICs

To obtain the latest version of a driver, go to:

http://www.3com.com/

The network driver can be used in both Microsoft and NetWare network environments.

*For instructions on using the installation diskettes (which can be created from the EtherCD) to install the network driver, see Installing From Diskette on page 29. For additional information, see the text file for your operating system in the HELP directory on the EtherCD.*

## Software Installation Requirements

Before you install software, you may want to verify that the installed server NICs are functional or change their configuration settings by running DOS diagnostics. Use the 3C99XCFG.EXE program located on the *EtherCD*.

If you are installing the software during the installation of the network operating system, see Installing a 3Com NIC While Installing the NOS on page 167.

For a list of minimum installation prerequisites, see Installation Requirements on page 28.

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## Getting Help

To display the Help system during the software installation, click *Help* on any 3Com window.

## Installing the Network Driver Using the EtherCD

To install the network driver using the *EtherCD*, follow the steps in the section that is specific to your Windows operating system.

Before installing the network driver:

- Make sure that the NIC is installed in the PC and that it is connected to the network.
- Make sure that you have the Windows installation files (for Windows 95/98 only). These files may be on a CD or diskettes, or they may have been copied to your hard drive when Windows was installed on your PC.

### Windows 2000

This section describes how to install the network driver and NIC software in a PC or server running Windows 2000.

Before you begin software installation:

- Make sure that all software installation requirements are met. See Installation Requirements on page 28.
- Install the hardware. For instructions, see Installing and Connecting the NIC on page 34.

Use the following procedure to install the driver for the first time in a computer that is running Windows 2000. (If you are updating a previous installation, see Updating the Network Driver and NIC Software on page 51.)

To install the software:

1 **Turn on the power to the PC.**

2 **Start Windows 2000 and log in to the Windows 2000 Administrator account.**

After The Windows 2000 Found New Hardware Wizard starts. The wizard detects the new NIC(s) and begins the driver installation.

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3 **Click *Next*.**

The Install Hardware Device Drivers screen appears.

4 **Insert the *EtherCD* in the CD-ROM drive.**

5 **Select Search for a suitable driver for my device (recommended), and then click *Next*.**

The Locate Driver Files screen appears.

6 **Select the CD-ROM drives option, clear any other checked options, and click *Next*.**

The Driver Files Search Results screen appears.

Windows finds the driver on the *EtherCD*.

7 **Click *Next*.**

The Hardware Install screen appears. Files are copied. Then the Complete the Found New Hardware Wizard screen appears, displaying the message "Windows has finished installing the software for this device."

8 **Click *Finish*.**

The software installation is complete. Go to Verifying Successful Installation on page 48 to confirm that the NIC is properly installed.

To change configuration settings, see Configuring the NIC on page 113.

## Windows NT 4.0

This section describes how to install the network driver and NIC software in a PC or server running Windows NT 4.0

***CAUTION:*** *Windows NT 4.0 Service Pack 6 (SP6) is a minimum system requirement for installing 3Com* Dynamic*Access technology.*

To install the network driver:

1 **Turn on the power to the PC and start Windows NT.**

2 **Log in to the Windows NT Administrator account.**

3 **Insert the *EtherCD* in the CD-ROM drive.**

4 **Right-click the Network Neighborhood icon.**

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5 **Select *Properties* on the pop-up menu.**

The Network window appears.

6 **Click the Adapters tab.**

If networking has not been installed on your PC before, Windows NT asks you if you want to install networking. Click *Yes*. See the WINNT.TXT file located on the *EtherCD* or your Windows NT documentation for instructions.

7 **Click *Add*.**

The Select Network Adapter dialog box appears.

8 **Click *Have Disk*.**

The Insert Disk dialog box appears.

9 **Make sure that the correct path to your CD-ROM drive appears in the entry box, for example:**

```
d:
```

10 **Click *OK*.**

The Select OEM Option screen appears, displaying two driver options:

```
3Com EtherLink 10/100 Mbps PCI NIC with 3XP
Processor

3Com EtherLink Server 10/100 Mbps PCI NIC with
3XP Processor
```

11 **If you have installed a client NIC (3CR990-TX-95 or 3CR990-TX-97), select:**

```
3Com EtherLink 10/100 Mbps PCI NIC with 3XP
Processor
```

**If you have installed a server NIC (3CR990SVR95 or 3CR990SVR97), select:**

```
3Com EtherLink Server 10/100 Mbps PCI NIC with
3XP Processor
```

12 **Click *OK*.**

Files are copied. The Network screen appears with the 3Com NIC name listed in the Network Adapters list box.

13 **Click *Close*.**

If the Microsoft TCP/IP Properties screen appears, enter the requested information for your network environment.

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Refer to your system administrator or the Windows NT documentation for assistance. After entering the appropriate TCP/IP information and clicking OK, the Network Settings Change window appears.

If the Microsoft TCP/IP Properties screen does not appear, the installation is complete. The Network Settings Change window appears.

**14 Click *Yes* to restart the PC.**

The network driver installation is complete. Go to Verifying Successful Installation on page 48 to confirm that the NIC is properly installed.

## Windows 98

This section describes how to install the network driver and NIC software in a PC or server running Windows 98.

Before installing the NIC software:

- Make sure that the NIC is installed in the PC and connected to the network.
- Make sure that you have the Windows 98 installation files. These files may be on a CD or diskettes, or they may have been copied to your hard disk when Windows 98 was installed on your PC.

*If you encounter problems during the installation, see TROUBLE.TXT (located in the HELP directory on the EtherCD) for troubleshooting tips.*

To install the software:

**1 Turn the PC power on.**

Windows detects the NIC. The Add New Hardware Wizard starts.

**2 Click *Next*.**

The Add New Hardware Wizard screen prompts you to select an option.

**3 Select the Search for the best driver for your device (Recommended) option, and then click *Next*.**

The Add New Hardware Wizard screen prompts you for the driver location.

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4 **Select the CD-ROM drive option and clear any other check options that are selected.**

5 **Insert the *EtherCD* in the CD-ROM drive, and then click *Next*.**

Windows finds the driver file for the device.

6 **Click *Next*.**

Files are copied.

The Insert Disk screen appears, prompting you for the Windows 98 CD-ROM.

7 **Click *OK*.**

The Copying Files dialog box appears.

8 **Remove the *EtherCD* from the CD-ROM drive, insert the Windows 98 CD, enter the path to the CD-ROM drive, and click *OK*.**

The Add New Hardware Wizard displays a message informing you that Windows has finished installing the software.

9 **Click *Finish*.**

The Systems Settings Change screen appears, prompting you to restart your computer.

10 **Click *Yes* to restart your computer.**

*You must restart your computer to complete the installation.*

The software installation is complete. Go to Verifying Successful Installation on page 48 to confirm that the NIC is properly installed.

## Windows 95

This section describes how to install the network driver and NIC software in a PC client or server running Windows 95.

***CAUTION:*** *Do not install a 3CR990 NIC while installing Windows 95 OSR2 using the "Custom" option. Install Windows 95 OSR2 first, then install the 3CR990 NIC.*

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Before installing the NIC software:

- Make sure that the NIC is installed in the PC and connected to the network.
- Make sure that you have the Windows 95 installation files. These files may be on a CD or diskettes, or they may have been copied to your hard disk when Windows 95 was installed on your PC.

*If you encounter problems during the installation, see W95NDIS.TXT and TROUBLE.TXT (located in the HELP directory on the EtherCD) for troubleshooting tips.*

To begin the driver installation, turn the PC power on. Windows detects the NIC and depending on the version of Windows 95 that you have installed, either the New Hardware Found screen appears, or the Update Device Driver Wizard starts.

### New Hardware Found

If the New Hardware Found screen appears, follow this procedure to install the NIC driver:

1 **Select the Driver from disk provided by hardware manufacturer option, and then click *OK*.**

The Install From Disk screen appears.

2 **Insert the *EtherCD* in the CD-ROM drive, enter the path to the CD-ROM drive, and click *OK*.**

- If networking has already been installed on your PC, go to step 4.
- If this is the first time that networking is being installed on your PC, the Identification tab of the Network screen appears. Go to step 3.

3 **In the specified fields of the Identification tab screen, enter the following information, and then click *Close*.**

- **Computer Name**—Identifies the PC on the network for other users. This entry must be a unique name of 15 characters or fewer, containing no spaces.
- **Workgroup**—Identifies the group (for example, your department name) to which your PC belongs. If your computer is connected to a peer-to-peer

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network, this entry must be exactly the same for all the PCs in your network.

- **Computer Description**—Displays additional details to other users on the network about this PC. For example, you could specify that the PC is connected to a printer. Filling in this field is optional.

**4 The Insert Disk screen appears, prompting you for the Windows 95 CD-ROM. Click *OK*.**

The Copying Files screen appears.

**5 Do one of the following:**

- If the Windows 95 files were not copied to your hard drive, remove the *EtherCD* from the CD-ROM drive, insert the Windows 95 CD, enter the path to the CD-ROM drive, and then click *OK*.
- If the Windows 95 files were copied to your hard drive, enter the path to the directory containing these files, and then click *OK*.

Files are copied. The Systems Settings Change screen appears, prompting you to restart your computer.

**6 Click *Yes*.**

*You must restart your computer to complete the installation.*

The installation is complete. To verify that the installation was successful, see Verifying Successful Installation on page 48.

*After Windows restarts, double-click the Network icon in the Control Panel and make sure that the configuration settings are properly set for your network environment. Contact your system manager for assistance.*

### Update Device Driver Wizard

If the Update Device Driver Wizard starts, follow this procedure to install the NIC driver:

**1 Insert the *EtherCD* in the CD-ROM drive, and then click *Next*.**

Windows finds the driver.

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**2 Click *Finish*.**

- If networking has already been installed on your PC, go to step 4.
- If this is the first time that networking is being installed on your PC, the Identification tab of the Network screen appears. Go to step 3.

**3 In the specified fields of the Identification tab screen, enter the following information, and then click *Close*.**

- **Computer Name**—Identifies the PC on the network for other users. This entry must be a unique name of 15 characters or fewer, containing no spaces.
- **Workgroup**—Identifies the group (for example, your department name) to which your PC belongs. If your computer is connected to a peer-to-peer network, this entry must be exactly the same for all the PCs in your network.
- **Computer Description**—Displays additional details to other users on the network about this PC. For example, you could specify that the PC is connected to a printer. Filling in this field is optional.

**4 The Insert Disk screen appears, prompting you for the *EtherCD*. Click *OK*.**

The Copying Files screen appears.

**5 Enter the path to the CD-ROM drive, and then click *OK*.**

Files are copied. The Insert Disk screen appears, prompting you for the Windows 95 CD-ROM.

**6 Click *OK*.**

The Copying Files screen appears.

**7 Do one of the following:**

- If the Windows 95 files were not copied to your hard drive, remove the *EtherCD* from the CD-ROM drive, insert the Windows 95 CD, enter the path to the CD-ROM drive, and then click *OK*.

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- If the Windows 95 files were copied to your hard drive, enter the path to the directory containing these files, and then click *OK*.

Files are copied. The Systems Settings Change screen appears, prompting you to restart your computer.

**8 Click *Yes*.**

*After Windows restarts, double-click the Network icon in the Control Panel and make sure that the configuration settings are properly set for your network environment. Contact your system manager for assistance.*

The driver installation is complete. Go to Verifying Successful Installation on page 48 to confirm that the NIC is properly installed.

*After Windows restarts, double-click the Network icon in the Windows Control Panel and make sure that the correct configuration settings are selected for your network environment. Contact your system administrator for assistance.*

## Verifying Successful Installation

Follow the steps for your operating system: Windows 2000, Windows NT 4.0, or Windows 95 and Windows 98.

### Windows 2000

To verify successful NIC installation:

**1 Right-click the My Computer icon, and then click *Properties*.**

**2 Select the Hardware tab, and then click *Device Manager* in the middle panel.**

**3 Double click *Network Adapters* and make sure that the name of the 3Com EtherLink NIC appears.**

If a red X or a yellow exclamation point (!) appears by the name of the NIC, the installation was not successful. See Troubleshooting the NIC on page 129 for troubleshooting help.

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## Windows NT 4.0

To verify successful NIC installation:

1 **Double-click the My Computer icon.**

The My Computer screen appears.

2 **Double-click the Control Panel icon.**

The Control Panel screen appears.

3 **Double-click the Network icon.**

The Network screen appears.

4 **Select the Adapters tab.**

5 **Make sure that the name of the NIC appears in the list of network adapters.**

If the name of the NIC does not appear in the list of network adapters, the installation was not successful. See Troubleshooting the NIC Installation on page 132 for troubleshooting help.

6 **Click *OK* to close the Network screen. Close the Control Panel screen and the My computer screen.**

You can also use the following alternative method to verify successful NIC installation:

1 **In the Windows task bar, click *Start*, *Programs*, *Administrative Tools*, and then *Windows NT Diagnostics*.**

The Windows NT Diagnostics screen appears.

2 **Select the Resources tab.**

If ELPPx appears in the displayed list in the Device column, the driver is successfully installed.

If ELPPx does not appear in the displayed list in the Device column, the installation was not successful. See Troubleshooting the NIC Installation on page 132 for troubleshooting help.

## Windows 95 and Windows 98

To verify successful NIC installation:

1 **Right-click the My Computer icon, and then click *Properties*.**

2 **Select the Device Manager tab.**

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3 **Double-click *Network adapters* and make sure that the name of the 3Com EtherLink NIC appears.**

If a red X or a yellow exclamation point (!) appears by the name of the NIC, the installation was not successful. See Troubleshooting the NIC Installation on page 132 for troubleshooting help.

## Installing the 3Com NIC Diagnostics Program

This section describes how to install the 3Com NIC Diagnostics program after you have already installed the network driver. This program is for PCs running Windows 2000, Windows NT 4.0, Windows 98, or Windows 95.

The 3Com NIC Diagnostics program allows you to run tests that determine the status of your network and the NIC. It also allows you to configure the NIC, view network statistics and LEDs, and access support databases.

*When you install the 3Com NIC Diagnostics program, the network driver is automatically updated to the latest version on the EtherCD.*

To install the 3Com NIC Diagnostics program:

1 **Turn on the power to the PC and start Windows.**

2 **Insert the *EtherCD* in the CD-ROM drive.**

The *EtherCD* Welcome screen appears.

3 **Click *NIC Software*.**

4 **Click *NIC Drivers and Diagnostics*.**

5 **Click *Update NIC Driver*.**

6 **Click *Update Drivers and Diagnostic Program.***

The Update screen appears, displaying a message indicating the 3Com NIC Update Kit has successfully updated the network software, and informing you that you must restart your PC.

7 **Click *OK* to return to the Update NIC drivers screen, and then exit the *EtherCD*.**

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8 **Restart Windows.**

The installation is complete.

## Starting the 3Com NIC Diagnostics Program

To start the 3Com NIC Diagnostics program:

1 **Open the Windows *Start* menu.**

2 **Select *Programs*, and then *3Com NIC Utilities.***

3 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostic screen appears. For instructions on using the program, see Running the NIC Diagnostics Tests on page 144.

Alternatively, you can also start the 3Com NIC Diagnostics program using the following procedure if the 3Com NIC Diagnostics icon is displayed on right side of the Windows task bar:

1 **Double-click the 3Com NIC Diagnostics icon.**

The 3Com NIC Diagnostic screen appears. For instructions on using the program, see Running the NIC Diagnostics Tests on page 144.

## Updating the Network Driver and NIC Software

The latest 3Com network drivers can be downloaded from:

`http://support.3com.com/infodeli/tools/nic/`

To update the network driver and NIC diagnostic software:

1 **Turn on the power to the PC and start Windows.**

2 **Insert the *EtherCD* (or disk 1 downloaded from the Web or created from the *EtherCD*) in the appropriate drive in the PC.**

The *EtherCD* Welcome screen appears.

3 **Click *NIC Software*.**

4 **Click *NIC Drivers and Diagnostics*.**

5 **Click *Update NIC Driver*.**

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6 **To update the network driver and NIC diagnostics software, click *Update Drivers and Diagnostics Program*.**

**To update the network driver and remove the NIC diagnostics software, click *Update Drivers and remove Diagnostics Program*.**

The Update screen appears, displaying a message indicating the 3Com NIC Update Kit has successfully updated the network software, and informing you that you must restart your PC.

7 **Click *OK* to return to the Update NIC drivers screen, and then exit the *EtherCD*.**

8 **Restart Windows.**

The installation is complete.

## Installing Multiple NICs

This section describes how to install multiple EtherLink PCI NICs in a PC running Windows 2000, Windows 98, Windows 95, or Windows NT 4.0.

*You must use these procedures to install multiple NICs. Failure to follow these procedures may lead to problems requiring you to reinstall your operating system.*

### Windows 2000, Windows 98, and Windows 95

To install multiple NICs in a PC running Windows 2000, Windows 98, or Windows 95, install and configure each NIC individually, following these steps:

1 **Install the first NIC in your PC and connect it to the network, as described in Installing and Connecting the NIC on page 34.**

***CAUTION:*** *Do not physically install the second NIC in your PC until you complete the driver installation for the first NIC, following the steps below.*

2 **Turn on the power to the PC and start Windows.**

3 **Insert the *EtherCD* when prompted, and then click *OK*.**

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4 **Follow the prompts on the screen to install the network driver.**

See Windows 2000 on page 40, Windows 98 on page 43, or Windows 95 on page 44, earlier in this chapter for driver installation instructions.

5 **After the network driver is installed, restart the PC.**

6 **After the PC restarts, exit Windows and turn the power off. Make sure that the PC is unplugged.**

7 **Install the second NIC in your PC and connect it to the network.**

8 **Plug in the PC power cord, turn on the power, and then start Windows.**

Windows detects the second NIC. The second NIC uses the same network driver as the first NIC. You are not prompted for the *EtherCD*.

When Windows starts, the second NIC appears under *Network adapters* in the Device Manager.

9 **Repeat the process for each additional NIC to be installed.**

## Windows NT 4.0

To install multiple NICs in a PC running Windows NT 4.0:

1 **Install the NICs in your PC and connect each to the network.**

2 **Turn on the power to the PC and start Windows NT.**

3 **Double-click the My Computer icon, then the Control Panel icon, and then the Network icon.**

The Network screen appears.

4 **Select the Adapters tab.**

5 **Click *Add*.**

The Select Network Adapter screen appears.

6 **Click *Have Disk*.**

7 **Insert the *EtherCD*.**

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8 **Make sure that d:\ appears in the entry box (where d:\ represents the letter name of the CD-ROM drive), and then click *OK*.**

The Select OEM Option screen appears with the name of one of the NICs selected. Only one NIC appears on this screen.

9 **Click *OK*.**

Files are copied. The Network screen appears with the name of the first installed NIC.

10 **Close the Network screen.**

If you are prompted for network information, enter the requested information.

11 **Restart the PC.**

12 **When Windows NT starts, repeat steps 3 through 11 for each NIC that is installed in the PC.**

*You will not be prompted for the EtherCD when you install the network driver for the second NIC.*

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# 4 INSTALLING DYNAMICACCESS SOFTWARE IN WINDOWS

## Overview

This chapter explains the following tasks on a computer running Windows 2000, Windows NT, Windows 98, or Windows 95:

- Installing the Dynamic*Access* LAN Agent for a client NIC
- Installing Dynamic*Access* software for a server NIC
- Configuring Groups and VLANs for a server NIC
- Using Windows 2000 offload features
- Installing Dynamic*Access* LAN Encryption Software

## Installing the DynamicAccess LAN Agent for a Client NIC

This section explains how to install and configure the Dynamic*Access* LAN agent on a client PC running Windows 95, Windows 98, or Windows NT 4.0.

*For an overview of the* Dynamic*Access LAN agent, see DynamicAccess LAN Agent on page 25. For detailed information on using, configuring, and troubleshooting the* Dynamic*Access LAN agent, you can download it from:*

`http://www.3com.com/dynamicaccess`

### Client PC Requirements

The Dynamic*Access* LAN agent can be installed on a PC running Windows 95, Windows 98, or Windows NT 4.0.

The Dynamic*Access* LAN agent is not supported on a PC running Windows 2000.

***CAUTION:*** *Do not install the* Dynamic*Access LAN agent on a PC running Windows 98 SE 1. The installation will result in system failure.*

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The following table lists the minimum client requirements and recommended Microsoft Service Packs (if any) for the version of the Dynamic*Access* LAN agent that is included on the *EtherCD*.

| Operating System | Requirements for Running Dynamic*Access* Technology on a Client PC | Recommended Microsoft Service Pack |
|---|---|---|
| Windows 2000 | 486/66 MHz CPU<br>32 MB RAM<br>5 MB available hard drive space | None required |
| Windows NT 4.0 | Pentium/100 MHz CPU<br>32 MB RAM<br>5 MB available hard drive space | Service Pack 6 (or later) |
| Windows 98 | 486/76 MHz CPU<br>32 MB RAM<br>5 MB available hard drive space | Service Pack 1 |
| Windows 95 | 486/76 MHz CPU<br>32 MB RAM<br>5 MB available hard drive space | Windows 95 OSR2 or Service Pack 1 |

## Installing the LAN Agent

To install the Dynamic*Access* LAN agent:

1. **Make sure that the NIC and the network driver are installed on your PC.**

   See Verifying Successful Installation on page 48 to confirm that the NIC is properly installed in the computer.

2. **Start Windows.**

3. **Insert the *EtherCD* in the CD-ROM drive.**

   The *EtherCD* Welcome screen appears.

4. **Click *NIC Software*.**

5. **Click Dynamic*Access Technology*.**

6. **Click *Install* Dynamic*Access Technology*.**

7. **Select the appropriate menu option for your operating system (*Windows 95/98* or *Windows NT 4.0*)**

*Ignore the Windows 2000 menu option. The* Dynamic*Access LAN agent is not supported on a PC running Windows 2000.*

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8 **Do one of the following:**

- If you selected Windows 95/98, click *Install* Dynamic*Access Technology for Windows 95/98*.
- If you selected Windows NT 4.0, click *Install* Dynamic*Access Technology for Windows NT 4.0*.

The Dynamic*Access* Software Installation program starts.

9 **When the Dynamic*Access* Technology installation is finished, exit the *EtherCD*, and then exit Windows.**

10 **Restart the PC.**

*You must restart the PC to complete the installation.*

## Verifying Successful Installation

After the Dynamic*Access* LAN agent is installed on the client PC, the following changes are visible in the Windows Network control panel:

- For each physical NIC installed in the client PC, a virtual NIC entry appears in the list of network adapters.

  All protocols are re-bound to the virtual NIC. The bindings to the physical NIC are still intact.
- A 3Com Dynamic*Access* LAN agent entry appears as a protocol.
- A 3Com Dynamic*Access* LAN agent icon is installed in the Windows Control Panel.

## Configuring the DynamicAccess LAN Agent

Contact your system administrator about using Dynamic*Access* technology at your site.

*The* Dynamic*Access LAN agent configuration instructions are intended for network administrators who have experience installing software and using management tools for an Ethernet network.*

The instructions in this section are for configuring the Dynamic*Access* LAN agent on a local client PC. You can obtain the complete configuration instructions by accessing the Dynamic*Access Software User Guide* on the *EtherCD*.

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To configure the Dynamic*Access* LAN agent on a local client PC:

1 **Double-click the 3Com Dynamic*Access* icon in the Windows Control Panel.**

The Traffic Prioritization tab of the Dynamic*Access* Setup screen appears.

2 **Select the tab containing the information you want to configure.**

**Traffic Prioritization**—Allows you to prioritize applications, which can ease bottlenecks in your network and allow critical applications to take network precedence.

**Fast IP**—Allows you to enable and configure Fast IP.

**Administration**—Allows you to set Dynamic*Access* control panel access, set VLAN options, enable efficient multicast control, and enable the prioritizing of traffic.

*For specific instructions on configuring any of the* Dynamic*Access technology options, click Help on the 3Com* Dynamic*Access screen or go to:*

http://www.3com.com/dynamicaccess

### Removing the DynamicAccess LAN Agent

For instructions on removing the Dynamic*Access* LAN agent from your client PC, see the Dynamic*Access* software user guide. You can download the user guide from:

http://www.3com.com/dynamicaccess

## Installing DynamicAccess Software for a Server NIC

Follow these steps to install Dynamic*Access* software for a server NIC installed in a Windows 2000 or Windows NT 4.0 computer:

1 **Make sure that the NIC and the network driver are installed on your PC.**

See Verifying Successful Installation on page 48 to confirm that the NIC is properly installed in the computer.

2 **Start Windows.**

3 **Insert the *EtherCD* in the CD-ROM drive.**

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The *EtherCD* Welcome screen appears.

4 **Click *NIC Software*.**

5 **Click Dynamic*Access Technology*.**

6 **Click *Install* Dynamic*Access Technology*.**

7 **Select the appropriate menu option for your operating system (*Windows 2000* or *Windows NT 4.0*)**

*Ignore the Windows 95/98 menu option.* Dynamic*Access server software is not supported on a PC running Windows 95 or Windows 98.*

8 **Do one of the following:**

- If you selected Windows 2000, click *Install* Dynamic*Access Technology for Windows 2000 Servers*.

  When Dynamic*Access* server features are installed for Windows 2000, LAN connections bind to the Dynamic*Access* protocol and real protocols bind to the Dynamic*Access* Miniport. Do not modify these bindings.

- If you selected Windows NT 4.0, click *Install* Dynamic*Access Technology for Windows NT 4.0 Servers*.

  When Dynamic*Access* server features are installed for Windows NT, NICs bind to the Dynamic*Access* protocol and real protocols bind to the Dynamic*Access* Miniport. Do not modify these bindings.

The Dynamic*Access* Software Installation program starts.

9 **When the Dynamic*Access* Technology installation is finished, exit the *EtherCD*, and then exit Windows.**

10 **Restart the PC.**

*You must restart the PC to complete the installation.*

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### Verifying Successful Installation

After the Dynamic*Access* software is installed on the server PC, the following changes are visible in the Windows Network control panel:

- For each physical NIC installed in the client PC, a virtual NIC entry appears in the list of network adapters.

  All protocols are re-bound to the virtual NIC. The bindings to the physical NIC are still intact.
- A 3Com Dynamic*Access* entry appears as a protocol.
- A 3Com Dynamic*Access* icon is installed in the Windows Control Panel.

## Configuring Groups and VLANs for a Server NIC

Dynamic*Access* technology server features allow you to configure load balancing groups and virtual LANs (VLANs). The features are described in Advanced Server Features on page 17.

The following Dynamic*Access* technology server features are available for NIC groups in Windows:

- load balancing
- RSL failover
- multiple VLANs

The examples in this section illustrate typical actions you might take in the course of maintaining a Dynamic*Access* server configuration in Windows.

### Planning the Configuration

Consider these items when planning groups and VLANs:

- Decide whether you want to use bidirectional load balancing, or transmit load balancing.

  To use bidirectional load balancing, you must assign a dedicated IP address for each load balancing group. This address must be unique (not used elsewhere on the network). For details, see Specifying a Dedicated IP Address on page 66.
- Decide which NICs are to be part of each group. Each group must include at least two NICs.

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- Decide whether you want to use a foreign (non-3Com) NIC in one of the groups.

  One foreign NIC (one that is not a 3Com EtherLink Server NIC) is allowed in one group per server.
- Decide which NIC is to be the primary NIC in each group. If a foreign NIC is used, it must be designated the primary NIC.
- Disable load balancing if you have set failover for a group of NICs operating at different speeds. Dynamic*Access* supports failover for a group of NICs operating at different speeds (for example, with one NIC operating at 10 Mbps, another operating at 100 Mbps, and another at 1,000 Mbps). However, Dynamic*Access* supports load balancing only for a group of NICs operating at the same speed (with all NICs operating at 10 Mbps, or all operating at 100 Mbps, or all at 1000 Mbps). For example, if you specify failover from a 3Com Gigabit EtherLink Server 1000 PCI NIC to a 3Com EtherLink 10/100 PCI NIC, you must disable load balancing for that group to achieve the best performance.
- For the best failover performance, turn the spanning tree feature off at switches that are connected directly to the server. If the spanning tree feature is turned on, a failover may be delayed up to 30 seconds while the switch processes the spanning tree algorithm.
- Plan the cable changes required to connect each primary NIC and all secondary NICs to the same network segment.
- Observe the recommended support limit of four groups per server.
- The following guidelines apply to groups under Windows 2000:

  **802.1p Support Property**—The value of the Windows 2000 802.1p support property must be the same for all NICs in a group. For example, if this property is enabled for the primary NIC, it must also be enabled for all other NICs in the group.

  **Microsoft Task Offload Support**—It is possible to form a group of NICs that have different levels of support for Microsoft Task Offload features (TCP

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Checksum, TCP Segmentation, and IP Sec). In this case, the offload support is limited to the features supported by all NICs in the group. For example, if two NICs in a group support all offload features but one NIC supports only TCP Checksum, then offload support for the group is limited to TCP Checksum.

- Observe these VLAN configuration guidelines:
  - Assign a VLAN ID number to each VLAN. If you are not using a DHCP server, each VLAN that is using IP services requires an IP address and subnet mask.
  - Dynamic*Access* software supports as many as 16 VLANs per server.
  - Each VLAN bound to TCP/IP must exist on a separate IP subnet. DHCP servers used to allocate IP addresses must be located on the same IP subnets as the VLANs.
  - Each VLAN bound to the IPX/SPX protocol must use a unique network number.
  - To avoid problems associated with blocked multicast streams, configure end stations that support the IEEE 802.1p GARP Multicast Registration Protocol specification (GMRP) on separate switch segments from stations that do not support it.
  - Under Windows 2000, when VLANs are enabled, the Windows 2000 802.1p Support property must be disabled for all the underlying miniports.
  - The following memory requirements are for multiple VLAN configurations. You can improve overall system performance with VLANs by increasing the physical RAM, the virtual memory page size, or both.

| Number of VLANs | Minimum RAM Size (MB) |
|---|---|
| up to 16 | 128 |

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***CAUTION:*** *Before creating or removing a load balancing group or VLAN, take note of configuration information such as IP addresses and IPX network numbers.* Dynamic*Access server software does not restore a network configuration to its pre-*Dynamic*Access state. Always verify that the network configuration conforms to your expectations after creating or removing a load balancing group or VLAN.*

## Working With Server Features

The Dynamic*Access* server features window contains tabs for these windows:

- In the Load Balance/RSL window, you can create and change Load Balancing/RSL groups. The NICs in a group work together to route traffic efficiently and to recover from failures.
- In the VLANs window, you can set up virtual LANs. All groups listed on the Load Balance/RSL window also appear as groups in the VLAN window. Any ungrouped NICs in the Load Balance/RSL window are also listed in the VLAN window.

### Windows 2000

Access Dynamic*Access* server features through the Windows 2000 Network and Dial-up Connections window as follows:

1. **Log in to Windows 2000 with administrator privileges.**
2. **Launch the Windows 2000 Network and Dial-up Connections window.**
3. **Select a Local Area Connection icon.**
4. **Click the right mouse button and select Properties.**

   The Local Area Connections Properties window appears.
5. **Click the General tab.**
6. **In the General window, select Dynamic*Access* Protocol and click Properties.**

   The Dynamic*Access* Protocol Properties window appears. Click the appropriate tab to configure server features.

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### Windows NT

Start Dynamic*Access* server features under Windows NT as follows:

1 **Log in to the Windows NT Administrator account.**

2 **From the Windows *Start* menu, select *Settings/Control Panel*.**

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**3 Double-click the Dynamic*Access* SW Server icon.**

The Dynamic*Access* Resilient Server Link/Load Balance/VLAN Configuration window appears. Click the appropriate tab to configure server features.

## Creating a Group

**1 Click the Load Balance/RSL tab.**

**2 In the Load Balance/RSL window, click *Create Group*.**

**3 In the Create Group dialog box, type a group name.**

**4 Set the load balancing:**

**To enable transmit load balancing—**Clear the *Receive Load Balance Enabled* check box and check the *Transmit Load Balance Enabled* box.

**To enable bidirectional load balancing**—Check both the *Transmit Load Balance Enabled* box and the *Receive Load Balance Enabled* box. Enter only the Host ID bytes required for a dedicated IP address. For example:

| | Byte 1 | Byte 2 | Byte 3 | Byte 4 |
|---|---|---|---|---|
| Class A | Network ID | Host ID | | |
| | | 24 | 1 | 253 |
| Class B | Network ID | | Host ID | |
| | | | 2 | 253 |
| Class C | Network ID | | | Host ID |
| | | | | 253 |

See Specifying a Dedicated IP Address on page 66 for more information on the dedicated IP address.

**To disable all load balancing**—Clear the *Receive Load Balance Enabled* and the *Transmit Load Balance Enabled* check boxes.

**5 Click *OK*.**

The name of the new NIC group appears in the Load Balancing/RSL Groups list box.

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## Adding NICs to a Group

1. **Click the Load Balance/RSL tab.**
2. **In the Load Balance/RSL window:**
   - Select a group from the Load Balancing/RSL Groups list.
   - Select a NIC from the Network Interface Cards list.
3. **Click *Add NIC*.**

   The NIC appears as part of the group in the Load Balancing/RSL list box.

   If you click *Add NIC* repeatedly, NICs are added to the group in the order that they are listed after the first NIC you selected.

## Specifying a Dedicated IP Address

Bidirectional load balancing requires that you specify a dedicated IP address for the load balancing group. This address specifies a Network ID and a Host ID, and it must be unique (not used elsewhere on the network). For example:

| | Byte 1 | Byte 2 | Byte 3 | Byte 4 |
|---|---|---|---|---|
| Class A | Network ID | Host ID | | |
| | 125 | 24 | 1 | 253 |
| Class B | Network ID | | Host ID | |
| | 139 | 25 | 2 | 253 |
| Class C | Network ID | | | Host ID |
| | 193 | 26 | 3 | 253 |

You can specify the dedicated IP address in the Create Group or Group Properties dialog boxes. You cannot specify the bytes for the Network ID; they are fixed. Specify the bytes for the Host ID for various classes of subnets as follows:

| Class | Byte 1 | Specify only bytes |
|---|---|---|
| A | 126 | 2, 3, and 4 (the three rightmost boxes). |
| B | 128 - 191 | 3 and 4 (the two rightmost boxes). |
| C | 192 - 223 | 4 (the rightmost box). |

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## Changing an IP Address

If another device is using a bidirectional load balancing group's dedicated IP address, you must change either the other device's IP address or that of the load balancing group. Use the appropriate procedure below:

Changing the Other Device's IP Address

After you change the other device's address, restart receive load balancing as follows:

1. In the Load Balancing/RSL window, select the group that had the duplicate address.
2. Click *Properties*.
3. In the Properties dialog box, click *OK*.
4. In the Load Balancing/RSL window, click *OK* to exit the window and restart receive load balancing.

Changing the Group's Dedicated IP Address

1. In the Load Balancing/RSL window, select the group that has the duplicate address.
2. Click *Properties*.
3. In the Properties dialog box, enter a new IP address and click *OK*.
4. In the Load Balancing/RSL window, click *OK* to exit the window and restart receive load balancing.

## Creating a VLAN

1. **Click the VLANs tab.**
2. **In the VLANs window, select a NIC or group from the VLANs list and click *Create VLAN*.**
3. **In the VLAN ID dialog box, type a VLAN ID number and click *OK*.**

   Legal VLAN ID numbers are from 1 – 511 and from 768 – 4095. Numbers in the range 512 – 767 are reserved.

   The new VLAN is added to the VLANs list.

   **Windows 2000**—If you create more than one VLAN, assign a VLAN ID number to each VLAN as follows:

   - Right-click My Network Places and select *Properties* from the menu.
   - In the next window, right-click a VLAN and select *Properties* from the menu.
   - Click *Configure*.
   - In the NIC Properties window, click TCP/IP.

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- In the next window, configure the IP address and subnet mask.

**Windows NT**—Restart the computer when the software prompts you to do so.

## Specifying Traffic Priorities

You can use the Dynamic*Access* Software Setup window to specify traffic priorities.

1 **Double-click the 3Com Dynamic*Access* icon in the Windows Control Panel.**

The Dynamic*Access* Software Setup window appears.

2 **Click the appropriate tab:**

- **Traffic Prioritization**—Prioritize applications to ease bottlenecks in the network and allow critical applications to take network precedence. You can turn traffic prioritization on or off independently for:
  - Each NIC that is not in a group and does not have VLANs
  - Each group that does not have VLANs
  - Each VLAN
  - Each virtual NIC (NIC, group, or VLAN) shown in the Traffic Prioritization control panel
- **Administration**—Set Dynamic*Access* control panel access, set VLAN options, enable efficient multicast control, and enable the prioritizing of multicast traffic.

*For detailed information on* Dynamic*Access software, go to:*

http://www.3com.com/dynamicaccess

## Saving the Configuration

To save and exit, click *OK*.

A prompt asks whether you want to configure traffic prioritization. If you click *Yes*, the Dynamic*Access* Software Setup window appears.

To exit without saving the configuration, click *Cancel*.

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## Disabling Load Balancing for a Group

Follow these steps to disable load balancing for a group:

1. **Click the Load Balance/RSL tab.**
2. **In the Load Balance/RSL window:**
   - Select a group from the Load Balancing/RSL Groups list.
   - Click *Properties*.
3. **In the Group Properties dialog box:**

   **To disable receive load balancing only—**Clear the *Receive Load Balance Enabled* check box.

   **To disable all load balancing—**Clear the *Receive Load Balance Enabled* and the *Transmit Load Balance Enabled* check boxes.
4. **Click *OK*.**

## Changing the Primary NIC

The first NIC added to an empty group is automatically designated the *primary NIC*. NICs added subsequently are designated as *secondary* NICs. If a foreign (non-3Com) NIC is used, it must be designated the primary NIC. Primary status is indicated by a P icon at the beginning of the NIC name.

When there are more than one NIC in a group, you can change the primary NIC as follows:

1. **Click the Load Balance/RSL tab.**
2. **In the Load Balance/RSL window, select a secondary NIC from the Load Balance/RSL Groups list.**
3. **Click *Select Primary*.**

## Removing a NIC from a Group

Follow these steps to remove a NIC from a group:

1. **Click the Load Balance/RSL tab.**
2. **In the Load Balance/RSL window, select a NIC from a group in the Load Balancing/RSL Groups list.**
3. **Click *Remove NIC*.**

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## Deleting or Editing a VLAN

When a VLAN is selected, you can delete it or edit its properties.

1 **Click the VLANs tab.**

2 **In the VLANs window, select a VLAN.**

To delete the selected VLAN, click *Delete VLAN*.

To edit the VLAN ID for the selected VLAN, click *Edit VLAN*.

## Displaying NIC Properties

Follow these steps to display NIC properties:

1 **Click the Load Balance/RSL tab.**

2 **In the Load Balance/RSL window, select a NIC.**

3 **Click *Properties*.**

The NIC Properties window appears, showing the properties of the selected NIC.

## Displaying Group Properties

Follow these steps to display group properties:

1 **Click the Load Balance/RSL tab.**

2 **In the Load Balance/RSL window, select a group in the Load Balancing/RSL Groups list box.**

3 **Click *Properties*.**

The Group Properties window appears, showing the properties of the selected group.

## Specifying Failover from Gigabit to 10/100 PCI

You can specify failover from a 3Com Gigabit Etherlink Server 1000 PCI NIC to a 3Com EtherLink Server 10/100 PCI NIC. To ensure optimal performance, this type of failover requires that you disable load balancing for the group.

1 **Create a group.**

See Creating a Group.

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2 **Add 3Com server NICs to the group.**

Add at least one 3Com Gigabit Etherlink Server NIC and at least one 3Com EtherLink Server 10/100 PCI NIC to the group. Designate the Gigabit Etherlink Server NIC as the primary NIC.

See Adding NICs to a Group on page 66.

3 **Disable load balancing for the group.**

See Disabling Load Balancing for a Group on page 69.

## Troubleshooting a Load Balancing Configuration

Use the troubleshooting tips in Table 1 to solve problems that may occur in a load balancing configuration.

*To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:*

`http://knowledgebase.3com.com`

**Table 1** Troubleshooting Load Balancing In Windows

| Symptom | Tip |
|---|---|
| Receive load balancing fails to begin functioning. | Check the Group Properties to verify that the dedicated IP address has been entered. If no address appears in the Group Properties dialog box, enter one to enable receive load balancing. |
| Receive load balancing stops functioning. | Cables may be disconnected, or there may be other hardware problems. Reconnect or change the cables. Correct any other hardware problems. Bidirectional load balancing is restored after this type of failure when applications create new connections and new clients log in. |
| Reconnecting cables does not restore load balancing. | Check the event log for a duplicate IP address. If another device is using a load balancing group's dedicated IP address, change one of the IP addresses. See "Changing an IP Address" for instructions. |

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**Table 1** Troubleshooting Load Balancing In Windows (continued)

| Symptom | Tip |
|---|---|
| Receive load balancing does not function across a router. | Receive load balancing across a router is not supported. Clients across the router cannot use receive load balancing, but clients within the subnet get higher throughput from receive load balancing. |

## Changing Windows 2000 Property Settings

If you receive warnings about inconsistent property settings (for example, the 802.1p Support property) while creating a group, use the following procedure to change a NIC property:

1. **Right-click the My Computer icon and select *Properties* from the menu.**
2. **Click the Hardware tab, then click *Device Manager*.**
3. **Double-click *Network Adapters*.**
4. **Right-click on the name of the appropriate NIC and select *Properties* from the menu.**
5. **Click the Advanced tab.**
6. **Select the appropriate property from the list (for example, 802.1p Support).**
7. **Use the scroll list to change the property value.**
8. **Exit the Device Manager.**

## Identifying Windows 2000 Miniport and LAN Connections

Dynamic*Access* miniport connections and NIC Local Area Connections are listed in the Network and Dial-up Connections window. If a group or VLAN is associated with a miniport, the group name and VLAN name appear in the

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miniport icon name. If a miniport is associated with an ungrouped NIC, you can identify the NIC by its MAC address as follows:

1 **In the Network and Dial-up Connections window, right-click the miniport icon and select *Properties* from the menu.**

2 **In the Dynamic*Access* Properties window, click the General tab.**

3 **In the General tab, move the cursor over the miniport name. (Do not click the name.)**

After a short pause, the MAC address of the associated NIC appears in a pop-up window.

## Using Windows 2000 Offload Features

The 3CR990 NIC supports Windows 2000 offload features in an IP environment. The Windows 2000 offload features are designed to enhance the Windows 2000 operating system capabilities by off loading key TCP/IP networking and security tasks from the Windows 2000 operating system:

- IPSec Offload—reduces CPU utilization by allowing the 3XP processor and a crypto chip on the NIC to perform data encryption operations.
- TCP Segmentation Offload—reduces CPU utilization by allowing the 3XP processor on the NIC to perform segmentation of TCP packets.

*Windows 2000 does not allow IPSec offloads and TCP Segmentation offloads for the same session. Though all offload types may be enabled, TCP Segmentation offloading will not occur during an IPSec session.*

- IP and TCP Checksum Offload—reduced CPU utilization by allowing the 3XP processor on the NIC to perform the checksum calculation of TCP/IP and UDP/IP packets.
- 802.1p Packet Priority Offload—reduces CPU utilization by allowing the 3XP processor on the NIC to perform the insertion of the 802.1Q tag header into the packet.

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## Enabling Offloads

Windows 2000 provides the capability to individually enable or disable each of the four offload features. (The default setting for these features is *enabled*.)

To enable or disable individual offload settings in Windows 2000:

1 **Right-click the My Network Places desktop icon and select Properties.**

The Network and Dial-up Connections screen appears.

2 **Right-click the Local Area Connection icon and select Properties.**

The Local Area Connection Properties screen appears.

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**3 Click *Configure*.**

The 3Com EtherLink 10/100 Mbps PCI NIC with 3XP Processor screen appears.

**4 Click the Advanced tab.**

**5 Select Enable Offloads in the Property list box.**

**6 Select the appropriate value in the Value entry box (shown in the following table) for the desired offload state.**

**7 Close all open windows.**

The following table describes values for the offload functions:

| Value | Offload Function Enabled |
|---|---|
| All Offloads Disabled | No offloads |
| cksum | TCP Checksum |
| cksum-ipsec | TCP Checksum and IPSec |
| cksum-tcpseg | TCP Checksum and TCP Segmentation |
| cksum-tcpseg-ipsec | TCP Checksum and TCP Segmentation and IPSec |
| ipsec | IPSec |
| tcpseg | TCP Segmentation |
| tcpseg-ipsec | TCP Segmentation and IPSec |
| 802.1p | Packet Priority |
| 802.1p-cksum | Packet Priority and TCP Checksum |
| 802.1p-cksum-ipsec | Packet Priority and TCP Checksum and IPSec |
| 802.1p-cksum-tcpseg | Packet Priority and TCP Checksum and TCP Segmentation |
| 802.1p-cksum-tcpseg-ipsec | Packet Priority and TCP Checksum and TCP Segmentation and IPSec |
| 802.1p-ipsec | Packet Priority and IPSec |
| 802.1p-tcpseg | Packet Priority and TCP Segmentation |
| 802.1p-tcpseg-ipsec | Packet Priority and TCP Segmentation and IPSec |

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### Configuring Offloads for a Group of Different NICs

Your computer may contain a combination of installed NICs (including one or more 3CR990 EtherLink 10/100 PCI NICs with the 3XP Processor) with varying offload capabilities. If you have a mix of dissimilar NICs configured in a Dynamic*Access* group, then Dynamic*Access* will support only those offload functions that are supported by the all the NICs in the group.

For example, if you have created a group consisting of a 3CR990 NIC and another NIC that does not have any offload capabilities, then the group will not support any offloads.

In another example, if you have a group of three NICs with two supporting TCP Checksum, TCP Segmentation, and IPSec offloads, and one supporting only IPSec, then the group will support only IPSec offloads.

If you add a NIC to an existing group, and that NIC has offload capabilities that differ from those of the group, then you must reconfigure the group: that is, you must delete the group, recreate the group, and restart the computer. (If you do not delete and recreate the group, Dynamic*Access* will not bind to the NIC.)

Similarly, if you replace a NIC that has been configured as part of a group with another NIC that has different offload capabilities, then you must reconfigure the group.

In addition, if you disable or enable any offloads for a group through the Windows 2000 Advanced tab, then you must reconfigure the group.

## Installing DynamicAccess LAN Encryption Software

This section explains how to install 3Com Dynamic*Access* LAN Encryption software in a PC running Windows 95 or Windows 98.

For complete instructions on using Dynamic*Access* LAN Encryption software, see the Dynamic*Access LAN Encryption Software Administrator's Guide,* which you can download to your PC hard drive from the *EtherCD* and view with a current Internet browser.

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## Minimum Installation Requirements

Your computer must meet the following requirements before you can successfully install the Dynamic*Access* LAN Encryption software.

### Hardware Requirements:

- Pentium 90 or better
- 24 MB RAM
- 25 MB free hard disk space (Windows 95); 17 MB free hard disk space (Windows 98)
- Color monitor

### Software Requirements:

- Windows 95A or Windows 95B (OSR2) or Windows 98 or Windows 98SE. Your Windows operating system should have the latest Service Pack installed.
- TCP/IP protocol.
- Client for Microsoft networks installed and configured to log in to a domain.

## Installation Overview

The 3Com EtherLink 10/100 PCI NIC must be installed and connected to the network *before* you install Dynamic*Access* LAN Encryption software. See Installing and Connecting the NIC on page 27 for instructions.

Installing the Dynamic*Access* LAN Encryption software involves the following tasks:

1. **Installing the software using the *Custom* option to download the Dynamic*Access LAN Encryption Software Administrator's Guide*.**
2. **Certifying each user (this task applies only when users rely on certificates for authentication).**

## Installing LAN Encryption Software on Windows 95

To install Dynamic*Access* LAN Encryption software on Windows 95, you need the installation CD (*EtherCD*) with your customized policy file(s), entrust.ini file (if you are using certificate-based authentication), and any connection profiles you wish to include.

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*The installation process installs the following required system components: Winsock 2 and DUN 1.3. For this reason, you may be prompted to reboot the system several times during installation. (For Windows 95 PCs without the DUN 1.3 upgrade, you may see as many as three requests to reboot.) When you click Yes to reboot, the installation program ignores the reboot and continues to install the software. This behavior is by design; only the last reboot request actually reboots the system, after the installation is complete.*

To install Dynamic*Access* LAN Encryption software from the *EtherCD*:

1 **Turn on the power to the PC and start Windows.**

2 **Insert the *EtherCD* in the CD-ROM drive.**

The *EtherCD* Welcome screen appears.

3 **Click *NIC Software*.**

The NIC Software screen appears.

4 **Click Dynamic*Access Technology*.**

The 3Com Dynamic*Access* Technology screen appears.

5 **Click *Install* Dynamic*Access Technology*.**

The 3Com Dynamic*Access* Technology menu appears.

6 **Click *Install 3Com* Dynamic*Access Technology for Windows 95/98*.**

The 3Com Dynamic*Access* Technology menu displays options for installing either Dynamic*Access* LAN Encryption Software or Dynamic*Access* Technology.

7 **Click *Install* Dynamic*Access LAN Encryption Software Windows 95/98*.**

The setup wizard launches for either 56-bit LAN (DES) encryption or 168-bit LAN (3DES) encryption depending on the model of your installed EtherLink 10/100 PCI NIC and the *EtherCD* inserted in your computer. A message prompts you to exit all Windows applications.

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8 **If you need to close any open applications, click *Cancel*, close the applications, and then restart the installation process. (Alternatively, you can press Ctrl-Tab to display each open application and close it.) Once you are ready to proceed, click *Next*.**

The Software License Agreement screen appears.

9 **Click *Yes* to continue.**

The Setup Type screen appears, offering you a *Typical* or *Custom* installation.

- **Typical**—the program will be installed without the online user guide.
- **Custom**—you can choose which components to install. This choice allows you to download and view the Dynamic*Access LAN Encryption Software Administrator's Guide*.

*Installing the* Dynamic*Access LAN Encryption software from a login script is not supported.*

10 **Select Custom Installation to install the Dynamic*Access* LAN Encryption software and to download the user guide to your computer's hard drive. Click *Next* to continue.**

The Select Components screen appears, allowing you to choose the components to be installed.

11 **Select both components: Dynamic*Access* LAN Encryption Software and Admin Documentation. Click *Next*.**

The Dynamic*Access* LAN encryption software screen appears.

12 **Verify that the displayed destination folder is correct for installation on your computer. Use the Browse button if necessary to change the destination folder. Once the appropriate destination folder is displayed, click *Next*.**

The Start Copying Files screen appears, displaying the components that will be installed.

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**13 Verify that the displayed components are correct for installation on your computer and click *Next*.**

The system copies files from the *EtherCD* to the destination location, sets up the registry, builds drivers, and updates bindings.

The Winsock2 Setup screen appears.

Follow the rest of the setup wizard instructions to install the software properly. If you see "version conflict" messages, click *Cancel* to continue. When prompted to reboot, click *Yes* (or *OK* or *Next*) to continue.

If you see "Winsock 2 setup" error messages, reboot the system and re-start the 3Com LAN Encryption installation.

If prompted to insert the Windows CD, insert it so that certain Windows files can be copied. (Prompting for the Windows CD depends on your PC configuration.) Follow the displayed prompts.

**14 With the Winsock2 Setup screen displayed, click *OK*.**

A warning message appears regarding the Dial-Up Networking Upgrade.

**15 Click *OK*.**

The Microsoft Dial-Up Networking screen appears, prompting you to restart.

**16 Click *Yes*.**

A message appears.

**17 Click *Yes*.**

A warning message appears, informing you that you must restart and then manually run the installation process again.

**18 Click *OK*.**

The computer will restart.

**19 Enter your network password when prompted.**

The setup wizard continues to build drivers. The Insert Disk screen appears, prompting you to insert the Windows 95 CD-ROM.

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**20 Insert the Windows 95 CD-ROM and click *OK*.**

If you are prompted to enter the path to the Windows 95 files (usually d:\win95), enter the appropriate path and click *OK*.

The Insert Disk screen appears, prompting you to reinsert the Windows 95 CD-ROM.

**21 Verify that the Windows 95 CD-ROM is inserted in the CD-ROM drive and click *OK*.**

Continue to respond to prompts for the Windows 95 CD-ROM, and specify the appropriate path for Windows 95 files to be copied until the System Settings Change screen appears, prompting you to restart the computer.

**22 With the System Settings screen displayed, click *Yes* to restart the computer.**

The system has completed copying files from the *EtherCD* and Windows 95 CD to the destination locations, set up the registry, built drivers, and updated bindings.

*After you have successfully installed the* Dynamic*Access LAN Encryption client, the physical adapters (NICs) and upper level protocols (TCP/IP, IPX, etc.) in your computer bind to the virtual adapters created by the* Dynamic*Access LAN Encryption software. The bindings of the upper level protocols to the physical adapters are removed and replaced with bindings to the virtual adapters.*

If you have not yet created one or more connection profiles, you may be prompted to use the Dynamic*Access* LAN Client dialog box to create the profiles. See the "Creating a Connection Profile" topic in the administrator's guide for more information.

*During installation, the policy files tssecmap.cfg and tssecdes.cfg are automatically copied from the EtherCD to your PC. See the "3Com LAN Encryption Secure Network Map File (tssecmap.cfg)" topic and the "Security Level Definition File (tssecdes.cfg)" topic in the administrator's guide for more information.*

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To use the Certificate Authentication mode, copy the entrust.ini file to the Windows directory on the client computer and then restart the PC. You can find a sample of the entrust.ini file on the *EtherCD*. See "Adding the Entrust File" on page 85.

## Installing LAN Encryption Software on Windows 98

To install Dynamic*Access* LAN Encryption software on Windows 98, you need the software installation CD (*EtherCD*), with your customized policy file(s), entrust.ini file (if you are using certificate-based authentication), and any connection profiles you wish to include.

To install Dynamic*Access* LAN Encryption software from the *EtherCD*:

1. **Turn on the power to the PC and start Windows.**
2. **Insert the *EtherCD* in the CD-ROM drive.**

   The *EtherCD* Welcome screen appears.
3. **Click *NIC Software*.**

   The NIC Software screen appears.
4. **Click Dynamic*Access Technology*.**

   The 3Com Dynamic*Access* Technology screen appears.
5. **Click *Install* Dynamic*Access Technology*.**

   The 3Com Dynamic*Access* Technology menu appears.
6. **Click *Install 3Com* Dynamic*Access Technology for Windows 95/98*.**

   The 3Com Dynamic*Access* Technology menu displays options for installing either Dynamic*Access* LAN Encryption Software or Dynamic*Access* Technology.
7. **Click *Install* Dynamic*Access LAN Encryption Software Windows 95/98*.**

   The setup wizard launches for either 56-bit LAN (DES) encryption or 168-bit LAN (3DES) encryption depending on the model of your installed EtherLink 10/100 PCI NIC and the *EtherCD* inserted in your computer. A message prompts you to exit all Windows applications.

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8 **If you need to close any open applications, click *Cancel*, close the applications, and then restart the installation process. (Alternatively, you can press Ctrl-Tab to display each open application and close it.) Once you are ready to proceed, click *Next*.**

The Software License Agreement screen appears.

9 **Click *Yes* to continue.**

The Setup Type screen appears, offering you a *Typical* or *Custom* installation.

- **Typical**—the program will be installed with the most common options.
- **Custom**—you can choose which components to install. This choice allows you to download and view the Dynamic*Access LAN Encryption Software Administrator's Guide*.

*Installing the* Dynamic*Access LAN Encryption software from a login script is not supported.*

10 **Select Custom Installation to install the Dynamic*Access* LAN Encryption software and to download the user guide to your computer's hard drive. Click *Next* to continue.**

The Select Components screen appears, allowing you to choose the components to be installed.

11 **Select both components: Dynamic*Access* LAN Encryption Software and Admin Documentation. Click *Next*.**

The Dynamic*Access* LAN encryption software screen appears.

12 **Verify that the displayed destination folder is correct for installation on your computer. Use the Browse button if necessary to change the destination folder. Once the appropriate destination folder is displayed, click *Next*.**

The Start Copying Files screen appears, displaying the components that will be installed.

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**13 Verify that the displayed components are correct for installation on your computer and click *Next*.**

The system copies files from the *EtherCD* to the destination location, sets up the registry, builds drivers, and updates bindings.

*After you have successfully installed the* Dynamic*Access LAN Encryption client, the physical adapters (NICs) and upper level protocols (TCP/IP, IPX, etc.) in your computer bind to the virtual adapters created by the* Dynamic*Access LAN Encryption software. The bindings of the upper level protocols to the physical adapters are removed and replaced with bindings to the virtual adapters.*

Follow the rest of the setup wizard instructions to install the software properly.

If you see "version conflict" messages, click *Cancel* to continue.

When prompted to reboot, click *Yes* to continue.

If you see "Winsock 2 setup" error messages, reboot the system and re-start the 3Com LAN Encryption installation.

If prompted to insert the Windows 98 CD, insert it so that certain Windows files can be copied. (Prompting for the Windows CD depends on your PC configuration.) Follow the displayed prompts.

The setup program continues once the appropriate Windows files have been located and copied to the appropriate Windows folders.

The Setup Complete dialog box appears.

**14 Select Yes, I want to restart my computer now and click *Finish* to restart your computer.**

If you have not yet created one or more connection profiles, you will be prompted to use the Dynamic*Access* LAN Client dialog box to create the profiles. See the "Creating a Connection Profile" topic in the administrator's guide for more information.

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*During installation, the policy files tssecmap.cfg and tssecdes.cfg are automatically copied from the EtherCD to your PC. See the "3Com LAN Encryption Secure Network Map File (tssecmap.cfg)" topic and the "Security Level Definition File (tssecdes.cfg)" topic in the administrator's guide for more information.*

To use the Certificate Authentication mode, copy the entrust.ini file to the Windows directory on the client computer and then restart the PC. You can find a sample of the entrust.ini file on the *EtherCD*. See "Adding the Entrust File."

## Adding the Entrust File

If you select certificates as your form of authentication, you must add the entrust.ini file to your Windows directory. This file points to the Entrust CA server and to the X.500 server (which stores certificates). It also lists the path to the directory containing the user's Entrust profiles (Dynamic*Access* LAN Encryption creates this directory as part of the installation process, and when storing a newly created certificate).

Dynamic*Access LAN Encryption software supports the Entrust Certificate Authority. If you do not have Entrust on your network, users must use shared-secret authentication. To take full advantage of Entrust/PKI security and key management features, you must install the Entrust/Entelligence product on the* Dynamic*Access LAN Encryption client computer. For more information on Entrust/Entelligence and Entrust/PKI, or to contact a representative, go to the Entrust Technologies World Wide Web site: http://www.entrust.com.*

The Entrust/Manager software stores the entrust.ini file in the Entrust directory on the Entrust CA server. You can find a copy of the entrust.ini file on the *EtherCD*. After installing the Dynamic*Access* LAN Encryption software, before rebooting the system, manually copy the entrust.ini file to the Windows directory on the client computer, and then reboot.

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## Starting DynamicAccess LAN Encryption Software

You start the Dynamic*Access* LAN Encryption software by choosing a secure profile.

1. **Right-click the padlock icon in the taskbar to see the secure profiles on your system.**
2. **Select the secure profile you want to use from the list.**
   - If your organization is set up to use certificates to authenticate the users on the network, you are prompted to provide your user name and password. Find your name in the User File list and provide your password in this dialog box.
   - If your organization is not using certificates to authenticate users, you are prompted to provide the shared secret for the connection. A shared secret must be agreed upon between you and the system to which you are connecting to secure the data communication.
3. **To switch to a different secure profile, right-click the padlock icon in the taskbar and select a different profile. The profile in use displays a check mark next to it.**

   You will be prompted to enter your user name and password for certificate authorization, or provide a shared secret when you switch to a different secure profile.

   For further information, view the online Dynamic*Access* *LAN Encryption Software Administrator's Guide*, as described in the next section.

## Viewing the Administrator's Guide Online

The EtherCD containing the Dynamic*Access* LAN Encryption software also contains an online software administrator's guide in WebHelp format. You can view the guide with the following recommended Internet browsers, which are freely available on the Internet or from the manufacturer on CD:

- Microsoft Internet Explorer Version 4 or later
- Netscape Navigator Version 4.03 or later

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Once you have installed the Dynamic*Access* LAN Encryption software and downloaded the Dynamic*Access LAN Encryption Software Administrator's Guide* to your computer's hard drive, you can view the guide online by following these steps:

1. **Click the Start button in the taskbar on your Windows desktop.**
2. **Select Programs.**
3. **Select 3Com.**
4. **Select Dynamic*Access* LAN Encryption Software Admin Guide.**

## Uninstalling LAN Encryption Software

To uninstall Dynamic*Access* LAN Encryption software from a Windows 95/98 computer, follow these steps:

1. **Click the Start button in the taskbar on your Windows desktop.**
2. **Select Settings.**
3. **Select Control Panel.**
4. **Double-click the Add/Remove Programs icon.**

   The Add/Remove Program Properties screen appears.
5. **In the Install/Uninstall tab, select Dynamic*Access* LAN Encryption Software.**
6. **Click the Add/Remove button.**

   The Confirm File Deletion dialog box appears, asking you to verify that you want to delete Dynamic*Access* LAN Encryption Software.

   **Click *Yes*.**

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# 5 INSTALLING NETWARE CLIENT AND SERVER DRIVERS

## Overview

This chapter describes how to install server drivers for Novell NetWare versions 3.12, 4.11, and 5.0.

To obtain the latest shipping version of a driver, go to:

http://www.3com.com/

## Installing and Configuring the NetWare Server Driver

This section describes how to install the NetWare driver on a Novell server running NetWare 3.12, 4.11, or 5.0. The \NWSERVER directory contains the network driver file (3C99X.LAN) to be used for servers running NetWare 3.12, 4.11, or 5.0. Additional files (NetWare Loadable Modules [NLMs]) that are required for servers running NetWare are on the *EtherCD* in the \NWSERVER directory, or they can be obtained from Novell.

### Using the Latest Support Packs

The 3CR990 NIC does not support NetWare 3.11 or 4.0x servers. The 3CR990 NIC does not support NetWare 3.12 or 4.11 servers that are not updated to the latest Novell Support Pack. NetWare 3.12 does not support 3CR990 NIC load balancing/failover or TCP/IP checksum offload/hardware checksumming.

***CAUTION:*** *If you plan to form load balancing/failover groups using NetWare 4.11 or 5.0, do not enable TCP/IP checksum offload for the 3CR990 NIC driver.*

Use the following support packs to achieve best results with the network driver.

| NetWare Version | Required Support Pack |
|---|---|
| 3.12 | Latest patch files. |

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| NetWare Version | Required Support Pack (continued) |
|---|---|
| 4.11 | Support Pack 6 or later for all types of operation.<br>Support Pack 7 or higher is required for proper operation of the failover mechanism for the 3CR990 server NIC. |
| 5.0 | Support Pack 2 or later |

*The required support pack must be loaded before you install the driver for the 3CR990 NIC.*

You can obtain the latest support packs from the Novell World Wide Web site:

http://www.support.novell.com

## Obtaining NetWare Loadable Modules

You can obtain current NLMs for the NetWare servers listed in the table below from the from the \NWSERVER directory on the *EtherCD*, or from the Novell World Wide Web site:

http://www.support.novell.com

| NetWare Server | NLM Name |
|---|---|
| NetWare 3.12 | ETHERTSM.NLM |
| | MSM31X.NLM |
| | NBI31X.NLM |
| NetWare 4.11, 5.0 | ETHERTSM.NLM |
| | TCPIP.NLM |
| | NBI.NLM |
| | MSM.NLM |

*To upgrade the NetWare driver for a NetWare server, you must create installation diskettes from the EtherCD that accompanied this product. Use these diskettes to install the Netware server driver. See Creating Installation Diskettes on page 30.*

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## Server Software Installation Requirements

Before you install software, you may want to verify that the installed NICs are functional or change their configuration settings by running DOS diagnostics. Use the 3C99XCFG.EXE program located on the *EtherCD*.

The instructions in this section demonstrate the fundamentals of setting up a sample server configuration. Setting up your own configuration may require a slightly different sequence of tasks and different numbers of NICs.

If you are installing the software during the installation of the network operating system, see Installing a 3Com NIC While Installing the NOS on page 167.

For a list of installation requirements, see Installation Requirements on page 28.

### Netware Packet Receive Buffers

Follow these guidelines for NetWare 4.11 and 5.0:

The driver requires 200 packet receive buffers for each installed NIC. You must increase the minimum and maximum packet receive buffers values by 200 for each installed NIC. For example, if you install two NICs, increase the parameters in the STARTUP.NCF file by 400 as follows:

**Before installing NICs**

```
SET MINIMUM PACKET RECEIVE BUFFERS = 1000
SET MAXIMUM PACKET RECEIVE BUFFERS = 2500
```

**After installing two NICs**

```
SET MINIMUM PACKET RECEIVE BUFFERS = 1400
SET MAXIMUM PACKET RECEIVE BUFFERS = 2900
```

### Slot Numbers for Multiple NICs

If you are installing more than one NIC on a server, you must know which NIC corresponds to a given PCI slot to connect a cable from the NIC to the appropriate port on the hub or switch. You can correlate slots with physical NICs by the NIC MAC addresses. (The MAC address is written on a bar code label on the top component side of the NIC.)

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### Obtaining Slot Numbers

The NetWare driver installation program requires you to enter a PCI *slot number* for each NIC. In older versions of NetWare software, the term slot number referred to the physical slot in which the NIC was installed in the server. Now, the slot number is a combination of the bus number, bus type, and the physical slot number. The value of a slot number can be 10001 or larger.

Follow this procedure to obtain slot numbers for a multi-NIC installation:

1. **Install only one 3CR990 NIC, as described in Installing and Connecting the NIC on page 34.**
2. **Follow the installation instructions in this chapter to load the *EtherCD*, copy the driver, and load the driver.**

   You need not specify a slot number when only one NIC is installed.
3. **In the NetWare Console, issue a CONFIG command.**
4. **Write down the slot number that is listed for the installed NIC.**
5. **Install the second 3CR990 NIC.**
6. **Follow the installation instructions in this chapter to install the driver on the second NIC.**

   Each time you load the driver, the CONFIG command displays the slot numbers for all the 3CR990 NICs in the system.

## Installing the NetWare 3.12 Server Driver

To install the driver in a NetWare 3.12 server:

1. **Copy the MSM31X.NLM, ETHERTSM.NLM, and NBI31.NLM files from the \NWSERVER directory on the *EtherCD* to the directory on your hard drive where other NLM files are located.**

*Copy the NLM files only if the versions existing on the server are older than the versions supplied on the EtherCD.*

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The NLM file location is typically in the sys:system directory. You need a NetWare client system to copy the NLM files to the server.

2 **Copy the LAN driver file (3C99X.LAN) from the *EtherCD* to the same directory.**

3 **Add the following two lines to the AUTOEXEC.NCF file:**

```
load sys:\system\3c99x.lan slot=<slot>
NAME=<name> FRAME=<frametype>
bind ipx to <name> net=<number>
```

*If you copy the NLM files to a different directory, you must specify the path in the preceding LOAD statement.*

4 **Save and exit the file, and then reboot the server.**

## Installing the Server Driver for NetWare 4.11 and 5.0 Using INETCFG

To install the driver in a NetWare 4.11or 5.0 server:

1 **Copy the MSM.NLM, ETHERTSM.NLM, and NBI.NLM files from the \NWSERVER directory on the *EtherCD* to the directory on your hard drive where other NLM files are located.**

*Copy the NLM files only if the versions existing on the server are older than the versions supplied on the EtherCD.*

***CAUTION:** You can configure load balancing only through the command line interface or by manually updating the AUTOEXEC.NCF file. You cannot have load balancing automatically configured by INETCFG.SYS.*

The NLM file location is typically in the *sys:system* directory. You need a NetWare client system to copy the NLM files to the server.

2 **Insert installation diskette 2 in drive A.**

3 **At the server prompt, type:**

```
load inetcfg
```

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4 **Press Enter.**

The Internetworking Configuration screen appears.

5 **In the displayed menu, select Boards, and then press Enter.**

6 **Press Insert.**

A list of currently installed drivers appears.

7 **Press Insert again.**

The New Driver dialog box appears.

8 **Specify the directory:**

```
a:\nwserver\3c99x.lan
```

9 **Press Enter.**

An updated list of installed drivers appears.

10 **Select 3C99x, and then press Enter.**

You are prompted to name the NIC, for example: **`3c99x_1`**.

11 **Type the name of the NIC and press Enter.**

You are prompted for the slot number. For information on how to verify the slot number, see Verifying the PCI Slot Number on page 99.

12 **Enter the slot number, and then press Enter.**

13 **Press Esc, Enter (to save), and then Esc.**

The Internetworking Configuration screen appears.

14 **Select Bindings, and then press Enter.**

The configured protocols for installed NICs appears. (This list will be empty if no protocols are currently bound to the NIC.)

15 **Press Insert.**

The Select From the List of Configured Protocols screen appears.

**For NetWare 5.0:**

- The default **To a Network Interface** is selected. Press Enter.

  The Select a Configured Network Interface screen appears.

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- Select the board. For example, enter: **`3c99x_1`**, and then press Enter.

**16 When prompted, enter the network number, and then press Enter.**

**17 In the Frame Type field, press Enter to display a list of frames, choose a frame, and press Enter.**

**18 Press Esc.**

You are prompted to save the changes.

**19 Press Enter to save the changes.**

The configured Protocol to Network Interface Bindings screen appears.

**20 Press Esc to Exit.**

The main menu appears.

- NetWare 4.11: Restart the server.
- NetWare 5.0:
  - Select **Reinitialize System**.
  - Press Enter to reinitialize.

Press Esc to exit from the program.

## Installing the Server Driver and DynamicAccess Technology Using AUTOEXEC.NCF

You can also install the server driver by editing (or adding new) LOAD commands in the AUTOEXEC.NCF file.

With NetWare installed and the server up and running, complete the following steps to install and configure the driver and Dynamic*Access* technology server features on a NetWare file server.

In NetWare screens, use the arrow keys to select an item and then press Enter.

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### Loading the 3Com EtherCD

NetWare 4.11 — Insert the CD in the CD-ROM drive and enter these commands:

```
load cdrom
cd mount 3C99XC_TXM
```

NetWare 5.0 — Insert the CD in the CD-ROM drive and enter this command:

```
load cdrom
```

Wait for the message that states the CD is mounted successfully, and then proceed to copy the driver.

### Copying the Driver

1 **Enter this command at the prompt:**

NetWare 4.11: **`load install`**

NetWare 5.0: **`load nwconfig`**

2 **In the Configuration Options screen, select *Driver options*.**

3 **In the Driver Options screen, select *Configure network drivers.***

4 **In the Additional Driver Actions screen, select *Select a driver.***

The Select a Driver screen appears, listing all previously saved drivers in the system.

If this is the first installation of the 3Com server NIC driver, it does not appear in this list.

5 **Press Insert.**

A system message for selecting a disk drive appears.

6 **Press F3.**

7 **Enter a path to the volume that contains the driver. For example:**

```
3C99XC_TXM:\nwserver
```

The Select a Driver to Install screen appears with the 3Com EtherLink Server NIC driver name highlighted.

8 **Press Enter to select the driver.**

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**9 Select *Yes* at the prompt to confirm the name of the driver to copy.**

The installation program copies the driver to the appropriate server subdirectory. The Configuration screen appears.

### Specifying the Slot Number

You need not specify the slot number if you are installing only one NIC.

**1 In the Configuration screen, select *Slot Number*.**

**2 Enter the slot number of the NIC that you want to install. For example:**

```
10001
```

See Changing NetWare Driver Configuration Parameters on page 103 for instructions on changing other parameters in this screen.

### Loading the Driver

**1 Select *Save parameters and load driver*.**

The installation program loads the configured driver and then writes the appropriate LOAD and BIND commands to the AUTOEXEC.NCF file.

The system assigns a network number.

**2 Enter a network number, or press Enter to select the system-assigned number.**

If no errors are encountered, the installation program asks whether you want to select an additional network driver.

**3 Select *Yes* to set up another NIC.**

### Setting Up Another NIC

**1 Follow the prompts for another NIC:**

- Select the driver
- Enter the slot number
- Save parameters and load the driver

**2 Repeat the process for all NICs to be set up.**

**3 After all NICs are set up, press Esc several times to return to the Installation Options screen.**

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## Installing Multiple Server NICs

To support more than one NIC in a NetWare server, change the AUTOEXEC.NCF file to the following format:

```
load 3C99X.LAN slot=<slot1> NAME=<name1>
FRAME=<frametype1>
bind ipx to <name1> net=<net1>
load 3C99X.LAN slot=<slot2> NAME=<name2>
FRAME=<frametype2>
bind ipx to <name2> net=<net2>
```

The values <slot1> and <slot2> are the numbers of the PCI slots in which the NICs are physically installed. To view the numbers of these PCI slots, use the 3Com Configuration and Diagnostic program for DOS. See Verifying the PCI Slot Number on page 99 for instructions.

The values <name1> and <name2> are unique names assigned to each NIC by your system administrator. The values <name1> and <name 2> must be different.

The frame parameters <frametype1> and <frametype2> can be one of the following:

- Ethernet_802.2
- Ethernet_802.3
- Ethernet_II
- Ethernet_SNAP

Make sure that the frametype for the server and the workstation is the same. For example, if the server uses Ethernet_802.2, the workstation must also use Ethernet_802.2.

The values <net1> and <net2> are unique numbers assigned by the system administrator to each NIC. Make sure that <net1> and <net2> are different numbers.

See the appropriate Novell NetWare manuals for further information.

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## Verifying the PCI Slot Number

To verify the PCI slot number in which a NIC is installed:

1 **Boot the NetWare server with the -na option.**

This prevents the AUTOEXEC.NCF file from loading. For example, enter:

```
server -na
```

2 **Issue the load command for the NIC LAN driver without a slot parameter.**

For example, enter:

```
load sys:\system\3C99X.lan
```

3 **NetWare lists the valid slot number(s) for the NIC, depending on how many NICs are installed. The values appearing in the list are the slot values that you should use.**

Example:

After you issue the command, a message appears. At the end of the message, additional text similar to the following appears:

```
Total of 2 3C99x PCI adapter card(s) found.
Supported slot values are 2,3.
Slot:2
```

## Installing Server Features

Two drivers are associated with Dynamic*Access* technology server features under NetWare: SE and LBRSL.

1 **From the Configuration Options screen select *Product options*.**

2 **Select *Install a product not listed*.**

The following message appears:

```
Product will be installed from A:\. If you are
installing from floppy, insert the first
diskette of the product you want to install
into the drive and verify that the path above
is correct.
       Press <F3> to specify a different path;
       Press <ENTER> to continue.
```

3 **Press F3.**

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**4 Enter this command:**

```
3C99xC_TXM:\nwserver
```

The following message appears:

```
Product "3Com DynamicAccess Server Features"
was found. Verify that this is the product you
want to install before proceeding.
       Press <ENTER> to continue.
       Press <ESC> to abort installation.
```

**5 Press Enter.**

The system copies the Dynamic*Access* technology server features software to the SYS volume.

## Configuring Groups

**1 Press Esc to return to the Installation Options screen.**

**2 From the Configuration Options screen, select *NCF files options (create/edit server startup files)***

**3 Select *Edit AUTOEXEC.NCF file*.**

**4 Make the following changes to the AUTOEXEC.NCF file:**

**a** Add a command to load the SE and LBRSL drivers before any commands to load LAN drivers. For example:

```
load se
load lbrsl
```

***CAUTION:*** *Do not set Novell's Load Balance Local LAN=ON when using SE and LIBRSL (the 3Com Load Balancing suite).*

**b** Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.

**c** For each Load Balancing/RSL group, load the same protocols and frame types on the primary and all secondary NICs.

**d** On the primary NIC only, bind a protocol to each slot-frame instance.

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**e** Remove any protocol BIND commands from each secondary NIC.

**f** For each group, add an LBRSL GROUP command to group the primary and secondary NICs together. There can be only one LBRSL GROUP command per group, and it must list the primary and all secondary NICs. Place this command after the LAN driver LOAD commands or the SYS:ETC\INITSYS.NCF command. To specify a load balancing group with resilient server links, use the LB option. To specify a resilient server link group without load balancing, use the RSL option.

***CAUTION:*** *If you are connecting the 3CR990 NIC to a spanning tree-enabled hub or switch, it is possible that the link may drop during load/reset. To avoid this potential problem, avoid creating the load balancing group in the AUTOEXEC.NCF file and comment out the LBRSL GROUP/BIND LB <slot 1><slot 2> line. Wait a couple of minutes until one of the clients connected to the server is able to "see" the server. Then use the command prompt on the server console screen to enter the command shown above to form the load balancing group.*

For the LBRSL GROUP command syntax, see Server Feature Commands on page 108.

For more information on maintaining the group configuration, see Maintaining Groups on page 104.

**5 Save the AUTOEXEC.NCF file and return to the server prompt.**

The sample AUTOEXEC.NCF file in Figure 6 shows a group of two NICs. The primary NIC in slot 10001 is bound to a secondary NIC in slot 10002.

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**Figure 6** AUTOEXEC.NCF File for One Group of Two NICs

```
load se
load lbrsl

;Define primary NIC slot-frame instances
load 3c990 slot=10001 frame=ethernet_802.2 name=p1_802.2
load 3c990 slot=10001 frame=ethernet_ii name=p1_ii

;Define secondary NIC slot-frame instances
load 3c990 slot=10002 frame=ethernet_802.2 name=p2_802.2
load 3c990 slot=10002 frame=ethernet_ii name=p2_ii

;Bind protocols to primary NIC
bind ipx to p1_802.2 net=FF02
bind ip  to p1_ii  address=192.1.1.1 mask=ff.ff.ff.00

;Create a group with NIC 10001 primary and NIC 10002 secondary
lbrsl group lb 10001 10002
;To create a resilient server link group without load balancing (for
;use with NICs from manufacturers other than 3Com) use the rsl option:
;lbrsl group rsl 10001 10002
```

## Verifying the Installation and Configuration

To verify that the driver has been properly loaded on the NetWare server, perform the following procedure:

1 **At the system prompt, enter:**

**`load monitor`**

The NetWare Monitor screen appears.

2 **From the *Available Options* menu, select *LAN/WAN Drivers*.**

The *Available LAN Driver* menu appears. If the driver has been properly loaded, the driver and frame types associated with the driver appear on this menu.

3 **Select a driver to view its associated statistics.**

A functioning driver displays packets being sent and received.

To verify that the server is communicating over the network, complete the following procedure:

1 **Set up a NetWare client on a LAN supported by the server to be tested.**

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**2 Log in or map to the server.**

If you cannot log in or map to the server, the link is not functional.

If the link is functional, the following message appears:

```
Link integrity test for primary
slot #XXXXX passed.
```

## Changing NetWare Driver Configuration Parameters

You can change server configuration parameters using the NetWare installation program Configuration screen. The following table lists the parameters shown on the Configuration screen. Default values are shown in uppercase text.

**Table 2** NetWare Installation Program Configuration Parameters

| Parameter | Range of Values | Description |
|---|---|---|
| Slot Number | All PCI slot numbers valid to the system | Represents the PCI slot number of the physical NIC to be configured. |
| Node Address | Default is factory-assigned MAC address. | Leave blank to use factory-assigned default. |
| ENABLE_CHKSUM | Enable<br>**DISABLE** | NetWare 5.0 only. Enter the parameter on the load line to enable TCP/IP checksum offload.<br>Do not enable TCP/IP checksum offload if you plan to form load balancing/failover groups. |
| SHD_LEVEL | None<br>Basic<br>**ENHANCED**<br>Basic + Enhanced | **Basic**—Monitors levels for the following self-healing driver conditions: firmware heartbeat, interrupt availability, recoverable transmit and receive errors (CRC, transmit underruns, receive overruns, collisions, jabbers).<br>**Enhanced**—Monitors DMA stalls and hardware errors. |
| VERBOSE | Enable<br>**DISABLE** | Enables driver warning and error messages. |

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## Maintaining Groups

Dynamic*Access* technology server features allow you to configure load balancing groups. The load balancing features are described in Advanced Server Features on page 17.

The following Dynamic*Access* technology server features are available for NIC groups in NetWare:

- load balancing
- RSL failover

The examples in this section illustrate typical actions you might take in the course of maintaining a Dynamic*Access* server configuration under NetWare. They show how to add NICs and groups to a server where Dynamic*Access* technology server features are already installed and configured.

Two drivers are associated with Dynamic*Access* technology server features in NetWare: SE and LBRSL.

### Planning the Configuration

- Plan the cable changes required to connect each primary NIC and all secondary NICs to the same network segment.
- For optimum failover performance, turn the spanning tree feature off at switches that are connected directly to the server. If the spanning tree feature must be turned on, a failover may be delayed up to 30 seconds while the switch processes the spanning tree algorithm.
- Decide which NICs are to be part of each group. Each group must include at least two NICs.
- Decide whether you want to use a foreign NIC in one of the groups.

  One foreign NIC (one that is not a 3CR990 NIC) is allowed in one group per server.
- Decide which NIC is to be the primary NIC in each group.

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- Decide whether groups are to perform load balancing:
  - Load balancing groups provide failover and share the network load.
  - Resilient server link groups provide failover, but do not share the network load.
  - If you plan to form load balancing/failover groups, do not enable TCP/IP checksum offload.
- To use bidirectional load balancing, you must assign a dedicated IP address for each load balancing group. This address must be unique (not used elsewhere on the network).
- Obtain the slot numbers of the NICs. You need these numbers if you are installing more than one NIC. See Obtaining Slot Numbers on page 92 for instructions.

## Adding a Secondary NIC to a Group

**1 Install the new secondary NIC.**

Follow the procedures in Installing and Connecting the NIC on page 34.

Connect the new secondary NIC to the network that is used by the group.

**2 Make the following changes to the AUTOEXEC.NCF file:**

- Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
- Load the same protocols and frame types on the new secondary NIC.
- Add the slot number of the new secondary NIC to the LBRSL GROUP command.

**3 Reboot the server.**

The sample AUTOEXEC.NCF file in the following figure shows a group of three NICs. The primary NIC in slot 10001 is bound to two secondary NICs in slot 10002 and slot 10003.

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**Figure 7** AUTOEXEC.NCF File for One Group of Three NICs

```
load se
load lbrsl

;Define primary NIC slot-frame instances
load 3c990 slot=10001 frame=ethernet_802.2 name=p1_802.2
load 3c990 slot=10001 frame=ethernet_ii  name=p1_ii

;Define secondary NIC slot-frame instances
load 3c990 slot=10002 frame=ethernet_802.2 name=p2_802.2
load 3c990 slot=10002 frame=ethernet_ii  name=p2_ii
load 3c990 slot=10003 frame=ethernet_802.2 name=p3_802.2
load 3c990 slot=10003 frame=ethernet_ii  name=p3_ii

;Bind protocols to primary NIC
bind ipx to p1_802.2 net=FF02
bind ip  to p1_ii  address=192.1.1.1 mask=ff.ff.ff.00

;Create a group with NIC 10001 primary and NICs 10002 and 1003 secondary
lbrsl group lb 10001 10002 10003
;To create a resilient server link group without load balancing (for
;use with NICs from manufacturers other than 3Com) use the rsl option:
;lbrsl group rsl 10001 10002 10003
```

## Adding a Group

1. **Install the NICs.**

   Follow the procedures in Installing and Connecting the NIC on page 34.

   Connect all NICs in the group to the same network.

2. **Make the following changes to the AUTOEXEC.NCF file:**

   - Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
   - In each group, load the same protocols and frame types on the primary and all secondary NICs.
   - On the primary NIC only, bind a protocol to each slot-frame instance.
   - Remove any BIND commands from each secondary NIC.
   - For each group, add an LBRSL GROUP command to bind the primary and secondary NICs together. There can be only one LBRSL GROUP command per group, and it must list the primary and all secondary NICs. Place this command after the LAN driver LOAD commands or the SYS:ETC\INITSYS.NCF command. To specify a load balancing group with resilient

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server links, use the LB option. To specify a resilient server link group without load balancing, use the RSL option.

For the LBRSL GROUP command syntax, see Server Feature Commands on page 108.

**3 Reboot the server.**

The sample AUTOEXEC.NCF file in Figure 8 shows one group of three NICs and one group of two NICs. The primary NIC in slot 10001 is bound to two secondary NICs in slot 10002 and slot 10003. The primary NIC in slot 10004 is bound to the secondary NIC in slot 10005.

**Figure 8** AUTOEXEC.NCF File for Two Groups of NICs

```
load se
load lbrsl

;Define Group 1 primary NIC slot-frame instances
load 3c990 slot=10001 frame=ethernet_802.2 name=p1_802.2
load 3c990 slot=10001 frame=ethernet_ii  name=p1_ii

;Define Group 1 secondary NIC slot-frame instances
load 3c990 slot=10002 frame=ethernet_802.2 name=p2_802.2
load 3c990 slot=10002 frame=ethernet_ii  name=p2_ii
load 3c990 slot=10003 frame=ethernet_802.2 name=p3_802.2
load 3c990 slot=10003 frame=ethernet_ii  name=p3_ii

;Define Group 2 primary NIC slot-frame instances
load 3c990 slot=10004 frame=ethernet_802.2 name=p4_802.2
load 3c990 slot=10004 frame=ethernet_ii  name=p4_ii

;Define Group 2 secondary NIC slot-frame instances
load 3c990 slot=10005 frame=ethernet_802.2 name=p5_802.2
load 3c990 slot=10005 frame=ethernet_ii  name=p5_ii

;Bind protocols to primary NICs
bind ipx to p1_802.2 net=FF02
bind ip  to p1_ii  address=192.1.1.1 mask=ff.ff.ff.00
bind ipx to p4_802.2 net=FF04
bind ip  to p4_ii  address=192.1.2.1 mask=ff.ff.ff.00

;Create Group 1 with NIC 10001 primary
;and NICs 10002 and 10003 secondary
lbrsl group lb 10001 10002 10003

;Create Group 2 with NIC 10004 primary
;and NIC 10005 secondary
lbrsl group lb 10004 10005

;To create resilient server link groups without load balancing
;use the rsl option:
;lbrsl group rsl 10001 10002 10003
;lbrsl group rsl 10004 10005
```

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## Server Feature Commands

Dynamic*Access* server feature commands for NetWare can be used to create sophisticated configurations of groups and for troubleshooting. You can enter them at the NetWare command line or add them to the appropriate NCF file. The commands are summarized below.

As shown in the examples, all commands are preceded by the keyword **lbrsl**.

### group

This command creates groups from specified slot parameters for primary and secondary NICs.

Syntax **lbrsl group lb addr *RxIPAddr pri_slot sec_slot* [sec_slot ...]**

**lbrsl group rsl *pri_slot sec_slot* [sec_slot...]**

where:

lb specifies a load balancing group.

rsl specifies a resilient server link group.

RxIPAddr is a dedicated IP address for the load balancing group

pri_slot is the PCI slot number of the primary NIC.

sec_slot is the PCI slot number of a secondary NIC.

Example **lbrsl group lb addr 192.1.1.100 10001 10002**

**lbrsl group rsl 10001 10002**

Default None

### display status

This command displays information about all groups, or if a primary slot parameter is specified, only about the specified group. A separate message is displayed for each loaded frame type. Board numbers are also displayed. Information about the relationship between the board numbers and the frame types is shown in the NetWare 5 Console Monitor. On the Available Options screen, select LAN/WAN drivers for this information.

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Syntax **lbrsl display status [*pri_slot*]**

where:

pri_slot is the PCI slot number of the primary NIC in the group for which information is to be displayed. If this parameter is not specified, information for all groups is displayed. An example of the type of information displayed follows:

Group NNN (LB group)

Primary board id: Original NNN, Current NNN

Load balancing on incoming IP packets: Enabled; IP Rx Addr: NN.NN.NN.NN

Primary node address: XX:XX:XX:XX:XX:XX

Timeout values in seconds: send NNN, receive NNN, wait NNN, link NNN

Probe Interval: NNN seconds

Slot number NNN (Active), Node Address: XXX:XXX:XXX:XXX:XXX:XXX

Example **lbrsl display status 10001**

## help

This command displays the syntax for the Dynamic*Access* server features commands.

Syntax **lbrsl help**

## link timeout

When a group is being created, the software waits the number of seconds specified by this command for the link/topology check to finish and then displays timeout information.

Syntax **lbrsl link timeout *seconds***

where:

seconds is the time in seconds.

Example **lbrsl link timeout 10**

Default 5

## probe interval

This command sets the probe packet interval. If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

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Syntax **lbrsl probe interval *seconds***

where seconds is the interval in seconds.

Example **lbrsl set probe interval 1**

Default 1 second

If the delay is longer than 1 second, NIC or link failures are not recognized as quickly.

### receive timeout

This command sets the receive timeout individually for each group and displays a message for each loaded frame type.

Syntax **lbrsl receive timeout pri_slot *seconds***

where:

pri_slot is the PCI slot number of the primary NIC.

seconds is the time in seconds

Example **lbrsl receive timeout 10001 1**

Default 1 second

### retry count

This command sets the number of retries that the software attempts when a probe packet fails to appear at the receive end. After the retries, the software puts the board in Wait mode. If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

Syntax **lbrsl retry count *number_of_retries***

where:

number_of_retries is any positive integer

Example **lbrsl retry count 2**

Default 5

### send timeout

This command sets the timeout value, in seconds, that the software waits before retransmitting a probe packet when a send request to the link support layer (LSL) is not acknowledged. A message is displayed for each loaded frame type.

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Syntax **`lbrsl send timeout pri_slot seconds`**

where:

pri_slot is the PCI slot number of the primary NIC.

seconds is the time in seconds.

Example **`lbrsl send timeout 1001 10`**

Default 10

### ungroup

This command deletes a group. The LAN driver for the group must not be loaded. The following message appears for all frame types that the NIC supports:

```
Cleaning up resources for group associated with
Primary Slot #xxxx.
```

Syntax **`lbrsl ungroup pri_slot`**

where:

pri_slot is the PCI slot number of the primary NIC.

Example **`lbrsl ungroup 10001`**

Default None

### wait timeout

This command sets the timeout value, in seconds, that the software waits before marking a NIC that is in wait mode as failed (see retry count). If no argument is specified or if the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

Syntax **`lbrsl wait timeout seconds`**

where:

seconds is any positive integer.

Example **`lbrsl wait timeout 2`**

Default 1

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## Troubleshooting a Group Configuration

Use the troubleshooting tips below to solve problems that may occur in a group configuration.

*To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:*

http://knowledgebase.3com.com

**Table 3** Troubleshooting Groups In NetWare

| Symptom | Tip |
|---|---|
| More than one non-3Com server NIC has been detected in one or more groups on this server. | You can use only one NIC that is not a 3Com *server* NIC in one 3Com load balancing/RSL group per server. Check the groups and remove all but one of the non-3Com *server* NICs from the groups. |

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# 6 CONFIGURING THE NIC

## Overview

This chapter describes how to configure the NIC.

*Before you change the NIC configuration settings, contact your system administrator.*

## Default NIC Settings

The table below lists the configuration settings for the NIC. The default setting is shown in uppercase in the Settings column.

| Option | Description | Settings |
|---|---|---|
| NetBoot ROM | Provides the ability to boot a PC over the network. Enables or disables the Netboot ROM (if a boot ROM is installed on the NIC). | ■ **ENABLED**<br>■ Disabled |

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| Option | Description (continued) | Settings |
|---|---|---|
| Duplex | Determines if the NIC transmits data across the network in both directions simultaneously (full-duplex) or in one direction at a time (half-duplex).<br>■ *Auto Select* allows the NIC to automatically connect at the duplex mode of the connected hub or switch. When you select this setting, the *Media Type* is automatically set to *Auto Select*.<br>■ *Full-Duplex* sets the NIC to operate in full-duplex mode. To use this setting, the switch that you are connected to must support full-duplex. You must also manually set the NIC *Media Type* setting.<br>■ *Half-Duplex* sets the NIC to operate in half-duplex mode. You must also set the NIC *Media Type* setting.<br>**Note**: If you are running Windows 2000, changes made to the Duplex setting though the 3Com NIC Diagnostics are not reflected in the registry unless you also change the Media Select property setting in Windows 2000:<br>1. In the Device Manager window, double-click Network adapters.<br>2. Right-click the 3CR990 NIC and select Properties.<br>3. Select the Advanced tab.<br>4. Select Media Select in the property list, and make the appropriate setting change in the Value list. | ■ **AUTO SELECT**<br>■ Full-Duplex<br>■ Half-Duplex |

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| Option | Description (continued) | Settings |
|---|---|---|
| Media Type | Determines the type of media your network is using.<br>■ *Auto Select* allows the NIC to automatically select the Media Type for you.<br>■ If you set the NIC *Duplex* setting to *Auto Select*, the *Media Type* is automatically set to *Auto Select*.<br>■ If you set the NIC *Duplex* setting manually, you must set the *Media Type* setting manually.<br>**Note**: If you are running Windows 2000, changes made to the Media Type setting though the 3Com NIC Diagnostics are not reflected in the registry unless you also change the Media Select property setting in Windows 2000:<br>1. In the Device Manager window, double-click Network adapters.<br>2. Right-click the 3CR990 NIC and select Properties.<br>3. Select the Advanced tab.<br>4. Select Media Select in the property list, and make the appropriate setting change in the Value list. | ■ **AUTO SELECT**<br>■ 100BASE-TX (100 Mbs)<br>■ 10BASE-T (10 Mbs) |
| Self Healing | Monitors firmware heartbeat and interrupt stalls, and tries to automatically reset the NIC.<br>Also monitors link status and reports changes. | ■ **ENABLED**<br>■ Disabled |
| Self Healing Enhanced | Checks for transmit/receive errors and tries to recover. | ■ **DISABLED**<br>■ Enabled |
| Error Tolerance | Specifies threshold levels fortransmit/receive errors. An RSL failover or NIC reset occurs when the threshold is exceeded during the sampling period.<br>■ Low = 5 of each error category<br>■ Medium = 50 of each error category<br>■ High = 100 of each error category | ■ Low<br>■ **MEDIUM**<br>■ High |
| Alert Type (Windows NT) | Enabled alert types are reported to the Windows System Events monitor. | ■ Off<br>■ Information<br>■ Warning<br>■ Error<br>■ **ALL** |

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## Configuration Methods

The NIC can be configured using any of the methods listed in the table below.

*This section describes how to configure the NIC using the 3Com NIC Diagnostics program for Windows. For instructions on using the other two methods, see the file or section mentioned in the table.*

| Method | Description | Requirement(s) |
|---|---|---|
| 3Com NIC Diagnostics program for Windows | Configure the NIC locally using the 3Com NIC Diagnostics program for Windows:<br>**1** Make sure that the 3Com NIC diagnostics program is installed. See Installing the 3Com NIC Diagnostics Program on page 50 for installation instructions. See Using the 3Com NIC Diagnostics Program on page 117 for usage instructions.<br>**2** Open the Windows *Start* menu.<br>**3** Select *Programs*, and then *3Com NIC Utilities*.<br>**4** Click *3Com NIC Doctor*. | Windows 2000<br>Windows NT 4.0<br>Windows 98, or<br>Windows 95 |
| 3Com Configuration and Diagnostics program for DOS | Configure the NIC locally using the 3Com Configuration and Diagnostics program for DOS:<br>**1** Reboot the PC using a DOS-bootable diskette.<br>**2** Insert the *EtherCD* in the PC.<br>**3** Enter at the DOS prompt:<br>**`d:\3c99xcfg.exe`**<br>See Using the 3Com DOS Configuration Program on page 118 for more information.<br>Customers running Japanese DOS must switch to U.S. mode DOS before running this program. | DOS or NetWare |

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| Method | Description | Requirement(s) |
|---|---|---|
| DMI 2.0 or 2.0s | Configure the NIC remotely using the 3Com DMI Agent software.<br>See Installing the 3Com DMI Agent on page 159 for more information. | 3Com DMI Agent and a DMI-compatible browser or a network management application that supports DMI 2.0 or 2.0s |
| Windows 2000 Advanced Tab | Configure the NIC locally as described in Changing Windows 2000 Property Settings on page 72. | Windows 2000 |

## Changing General NIC Configuration Settings

This section describes two NIC configuration methods. Depending on your PC operating system, you can use one of the following configuration programs:

- **3Com NIC Diagnostics Program**—for PCs running Windows 2000, Windows NT 4.0, Windows 98, or Windows 95.
- **3Com Configuration and Diagnostics Program for DOS**—for PCs running DOS and NetWare.

### Using the 3Com NIC Diagnostics Program

This section describes NIC configuration for PCs running Windows 2000, Windows NT 4.0, Windows 98, or Windows 95.

Before you configure the NIC, make sure that:

- The NIC is installed in the PC and is connected to the network.
- The network driver is installed.
- The 3Com NIC Diagnostics program is installed.

To change the NIC general configuration settings, such as network driver optimization, duplex mode, and media type:

1 **Open the Windows *Start* menu.**

2 **Select *Programs*, and then *3Com NIC Utilities.***

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3 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostics General screen appears.

*Click Help to obtain general information about the function of a screen. To obtain specific information about any topic on a screen, click the question mark (?) in the upper right corner of the screen, move it over a topic, and click once.*

4 **If your PC has more than one NIC installed, open the Network Interface Card (NIC) list box and select the NIC to be configured.**

5 **Click the Configuration tab.**

The Configuration screen appears.

6 **Under Network Parameter, select the setting to be changed.**

For a description of each setting, click the question mark (?) in the upper right corner of the screen, move it over a setting, and click once.

7 **Open the Set Value list box and select a new value from the list of available options.**

Repeat the process to change any other configuration setting.

To undo changes and return the settings to their previous values, click *Undo Changes*.

To return the settings to the factory default settings, click *Set Factory Defaults*.

8 **Click *OK* to save the changes and exit the program.**

*For complete instructions on using the 3Com NIC Diagnostics program, see Running NIC Diagnostics on page 143.*

## Using the 3Com DOS Configuration Program

This section describes NIC configuration for computers running DOS or NetWare.

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To run the DOS diagnostic program:

1 **Boot to DOS (see note following), and then insert the *EtherCD* in the CD-ROM drive.**

*If you do not have a DOS-bootable diskette, see Making a DOS-Bootable Diskette on page 30 for instructions.*

2 **Enter the following at the DOS prompt:**

```
d:\3c99xcfg.exe
```

where d:\ is the drive containing the *EtherCD*.

If multiple NICs are installed in the PC, select Select NIC on the first screen to display a list of installed NICs. Use the arrow keys to select the NIC that you want to configure and press Enter.

3 **Use the arrow keys to scroll the list and make a selection. Press Enter.**

*On the Configuration screen, when you choose the Auto Select setting for Media Type, the setting for Duplex is automatically changed to Auto Select. Selecting Auto Select for Duplex automatically changes the Media Type setting to Auto Select.*

*Note that any configuration change you make through the Windows 2000 Advanced tab overrides the same configuration setting made through the 3Com NIC (Windows) Diagnostic program or the 3Com DOS Diagnostic program.*

4 **Continue this procedure for other options. For more information on a specific option, select the option and press F1.**

*Press Esc to return to a previous screen. If a secondary window is open, press Esc to close the window.*

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## Configuring the Managed PC Boot Agent (MBA)

This section explains how to configure the Managed PC Boot Agent (MBA) boot ROM to boot from the network.

*For detailed information on using, configuring, and troubleshooting the MBA boot ROM, see the Managed PC Boot Agent User Guide, located with the MBA software on the EtherCD.*

### Enabling or Disabling the Boot ROM Setting

The default NIC boot ROM setting is *Disabled*. This setting must be enabled to boot from the network.

To enable or disable the NIC boot ROM setting:

1. **Make sure that the NIC is installed and is connected to the network and that the NIC driver is installed.**
2. **Open the Windows *Start* menu.**
3. **Select *Programs*, and then *3Com NIC Utilities.***
4. **Click *3Com NIC Doctor.***

   The 3Com NIC Diagnostics General screen appears.
5. **Select the Configuration tab.**

   The Configuration screen appears.
6. **Under Network Parameter, select *NetBoot ROM*.**
7. **Open the Set Value list box and select *Enabled* to enable the boot ROM or *Disabled* to disable the boot ROM.**
8. **Click *OK* to save the setting and exit the program.**

### Booting From the Network

The boot process for the MBA boot ROM varies depending on the type of PC you have (BBS BIOS-compatible or non-BBS BIOS-compatible).

If your PC was purchased recently, it may be BBS (BIOS Boot Specification) BIOS-compatible. The BBS determines how the system BIOS identifies boot devices in a PC (such as a CD-ROM drive, a hard drive, or a floppy drive), allows the user to select the boot order of these devices, and then attempts to boot from each device in the specified order.

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Refer to your PC documentation if you do not know which type of PC you have.

### BBS BIOS-Compatible PCs

To enable a BBS BIOS-compatible PC to boot from the network using the MBA boot ROM:

1 **Make sure that the NIC boot ROM setting is *Enabled.***

See the previous section, Enabling or Disabling the Boot ROM Setting, for instructions.

2 **Set the MBA manually as the first boot device in the PC BIOS.**

Refer to your PC documentation for instructions on accessing and configuring the PC BIOS.

3 **Reboot the PC.**

The MBA attempts to boot from the network using the default boot method PXE.

***CAUTION:*** *For computers running Windows 98, boot directly to DOS instead of restarting in MS-DOS mode from Windows 98. The MBACFG.EXE program will not work properly if you restart in MS-DOS mode with the 3CR990 NIC drivers loaded.*

To change the default method or any other MBA configurations, press Ctrl+Alt+B when the following message appears:

```
Initializing MBA. Press Ctrl+Alt+B to
configure...
```

If the network boot fails, the following message appears:

```
Network boot aborted, press any key to continue
```

The BIOS continues to the next device in the boot order (for example, the local hard drive).

*To cancel the network boot, press Esc anytime during the network boot process.*

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### Non-BBS BIOS-Compatible PCs

To enable a non-BBS BIOS-compatible PC to boot from the network using the MBA boot ROM:

1 **Make sure that the NIC boot ROM setting is *Enabled.***

See Enabling or Disabling the Boot ROM Setting on page 120 for instructions.

2 **Change the MBA default boot setting from *Local* to *Network*.**

To change the default boot setting or any other MBA configurations, use the MBACFG utility or press Ctrl+Alt+B when the following message appears:

```
Initializing MBA. Press Ctrl+Alt+B to
configure...
```

*For more information on using, configuring, and troubleshooting the MBA boot ROM, see the Managed PC Boot Agent User Guide, located with the MBA software on the EtherCD.*

## Disabling the 3Com Logo

To disable the 3Com logo that appears during startup:

1 **Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.**

2 **Open the Windows *Start* menu.**

3 **Select *Programs*, and then *3Com NIC Utilities.***

4 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostics General screen appears.

5 **On the General screen, make sure that the check box next to *Show Bitmap on Startup* is not selected.**

6 **Exit the 3Com NIC Diagnostics program.**

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# 7 CONFIGURING IP SECURITY

## Overview

The EtherLink PCI NIC accelerates IP security (IPSec) data encryption from supported operating systems that provide this offload capability. This feature is currently available in the Microsoft Windows 2000 operating system.

*Data encryption is available for Windows 95 and Windows 98 through* Dynamic*Access LAN Encryption software provided on the EtherCD. See Data Encryption on page 14 for more information.*

IPSec consists of two parts:

- encryption/decryption
- authentication

To send or receive encrypted data in a PC running Windows 2000 with an EtherLink PCI NIC installed, you must first create a *security policy*, and then enable encryption on the NIC. The security policy establishes and defines how encrypted network traffic between your PC and a specified server occurs.

Authentication enables the receiver to verify the sender of a packet by adding key fields to a packet without altering the packet data content.

The following table shows the available levels of encryption:

| Encryption Type | Encryption Level | Description |
|---|---|---|
| AH | medium | Authentication only |
| ESP | high | Authentication and encryption |

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| Encryption Type | Encryption Level | Description (continued) |
|---|---|---|
| Custom | varies | This provides encryption and an extra authentication that includes the IP header.<br>Custom allows you to select options for both AH and ESP, such as MD%/SHA-1 and DES/3DES. And you can select the rate at which new keys are negotiated.<br>Microsoft uses IKE key exchange to renew keys every x seconds or y bytes. However, this practice is computationally very high in overhead. Some users may set these values low and have frequent key updates. Users more concerned with performance will set these values higher.<br>For more information, see the Microsoft documentation about creating IPSec flows. |

## Creating a Security Policy

The process you use to create and enable a security policy will depend on your network environment requirements. The following is an example of one approach to creating a security policy.

*You must complete all of the sequences in this section to establish and enable a security policy for transmitting and receiving encrypted data over the network.*

### Defining the Console

This sequence establishes the Console and defines its parameters.

To define the Console:

1 **In the Windows taskbar, click *Start*, *Programs*, *Accessories*, and then *Command Prompt*.**

2 **At the DOS prompt, type MMC and press Enter.**

The Console1 screen appears.

3 **In the menu click *Console* and then *Add/Remove Snap-in.***

The Add/Remove Snap-in screen appears.

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4 **Click *Add*.**

The Add Standalone Snap-in screen appears.

5 **Select IP Security Policy Management, and then click *Add*.**

The Select which computer this Snap-in will manage screen appears.

6 **Enable the Local computer option.**

7 **Click *Finish*, *Close*, and then *OK*.**

## Creating the Policy

This sequence creates and names the new security policy.

The Console1and Console Root screen appears with *IP Security Policies on Local Machine* displayed in the list.

1 **In the left pane, click *IP Security Policies on Local Machine*.**

2 **Right-click inside the right pane below the list items.**

3 **From the pop-up menu, select Create IP Security Policy.**

The IP Security Policy Wizard Starts.

4 **Click Next.**

The IP Security Policy Name screen appears.

5 **Enter a name for the new security policy that you are creating. You can enter a description to help you identify this policy.**

6 **Click *Next*.**

The Requests for Secure Communication screen appears.

7 **Clear the *Activate the default response rule* check box.**

8 **Click *Next* and then *Finish*.**

A screen appears with the name of the new security policy in the title bar.

9 **Click *Add*.**

The Security Rule Wizard starts.

10 **Click *Next*.**

The Tunnel Endpoint screen appears.

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11 **Enable the default option *This rule does not specify a tunnel*, and then click *Next*.**

The Network Type screen appears.

12 **Enable the default option *All network connections*, and then click *Next*.**

The Authentication Methods screen appears.

13 **Enable the *Use this string to protect the key exchange (preshared key):* option, type the appropriate string text in the entry field, and then click *Next*.**

## Creating a Filter

This sequence creates a filter for the policy.

The IP Filter List screen appears.

1 **Click *Add*.**

A new IP Filter List screen appears.

2 **Enter a name for the filter, and then click *Add*.**

The IP Filter Wizard starts.

3 **Click *Next*.**

The IP Traffic Source screen appears.

4 **Click *Next*.**

The IP Traffic Destination screen appears.

5 **Select A Specific IP Address in the pull-down list.**

The IP Address entry box appears on the IP Traffic Destination screen.

6 **Enter destination IP address, and then click *Next*.**

The IP Protocol Type screen appears.

7 **Accept the default, and then click *Next*.**

8 **Click *Finish* to close the IP Filter Wizard.**

9 **Click *Close* to close the IP Filter List screen.**

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## Binding the Filter

This sequence attaches the new filter to the policy.

The IP Filter List screen appears.

1. **Enable the option for the new filter name and make sure that the new filter name is selected.**
2. **Click *Next*.**

## Creating the Filter Action

This sequence defines how the filter acts on the policy.

The Filter Action screen appears.

1. **Click *Add*.**

   The Filter Action Wizard starts.
2. **Click *Next*.**

   The Filter Action Name screen appears.
3. **Enter a name (for example: 3DES to the Server), and then click *Next*.**

   The Filter Action General Options screen appears.
4. **Accept the default, and then click *Next*.**

   The screen, Communicating with computers that do not support IPsec, appears.
5. **Accept the default value, and then click *Next*.**

   The IP Traffic Security screen appears.
6. **Select Custom and then click *Settings*.**

   The Custom Security Method Settings screen appears.
7. **Enable the *Data integrity and encryption (ESP):* check box, and then make the appropriate selections in the Integrity and algorithms list boxes.**
8. **Click *OK*, *Next*, and then *Finish*.**

## Binding the Filter Action

This sequence attaches the new filter action to the filter and policy.

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The Filter Action screen appears.

1 **Enable the filter action option and make sure that the filter name is selected. (In this example, we used the filter name: *3DES to the Server*.)**

2 **Click *Next*, *Finish*, and then *Close*.**

The newly created policy appears in the right pane of the Console Root\IP Security Policies on Local Machine screen.

3 **Exit this screen and, when prompted, save the new policy information. Use a meaningful name for future reference.**

You can modify this security policy by double clicking the icon that is created when you save the policy in the previous step.

## Enabling Encryption

An encryption policy must exist in the Console Root\IP Security Policies on the Local Machine screen before you can enable encryption on the 3CR990 NIC.

To enable encryption:

1 **Right-click the desired policy icon in the right pane of the screen.**

2 **Select Assign.**

3 **A green plus (+) symbol appears on the policy icon to indicate that encryption is toggled on.**

## Disabling Encryption

An encryption policy must exist in the Console Root\IP Security Policies on the Local Machine screen, and be enabled, before you can disable encryption on the 3CR990 NIC.

To disable encryption:

1 **Right-click the desired policy icon in the right pane of the screen.**

2 **Select Un-assign.**

The absence of a green plus (+) symbol on the policy icon indicates that encryption is toggled off.

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# 8 TROUBLESHOOTING THE NIC

## Overview

This chapter describes procedures for locating problems you might have with the EtherLink PCI NIC. It explains how to:

- Interpret the NIC LEDs.
- Access 3Com support databases.
- Troubleshoot NIC installation problems.
- Troubleshoot NIC and network connection problems.
- Troubleshoot Remote Wake-Up.
- Remove the network driver.

*To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:*

`http://knowledgebase.3com.com`

## Interpreting the LEDs

The EtherLink PCI NICs have light-emitting diodes (LEDs), as described in the following table, that can assist with network troubleshooting. Three LEDs are located below the cable connector. The LEDs operate as follows:

| LED | State | Meaning |
|---|---|---|
| 10 LNK (link) | On | If drivers are installed, the 10BASE-T connection is active. |
| | | If drivers are not installed, the NIC is receiving power. |
| | Off | Something is preventing the connection between the NIC and the hub or switch. |
| | Blinking | The cable polarity is reversed. Try a different network cable or contact the system administrator. |

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| LED | State | Meaning (continued) |
|---|---|---|
| 100 LNK (link) | On | If drivers are installed, the 100BASE-TX connection is active. |
| | | If drivers are not installed, the NIC is receiving power. |
| | Off | Something is preventing the connection between the NIC and the hub or switch. |
| | Blinking | The cable polarity is reversed. Try a different network cable or contact the system administrator. |
| ACT (activity) | Blinking | Network traffic is present. |
| | Steady | Heavy network traffic is present. |
| | Off | No network traffic is present. |

If a LNK LED indicates a problem, check the following:

- Ensure that the network hub or switch and the cable connecting to the NIC comply with the specifications appropriate for the network connection.
- Ensure that the hub or switch is powered on.

## Viewing the NIC LEDs in the Diagnostics Program

To view the LEDs in the 3Com NIC Diagnostics program:

1 **Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.**

*For instructions on using the 3Com NIC Diagnostics program, see Running NIC Diagnostics on page 143.*

2 **Open the Windows *Start* menu.**

3 **Select *Programs*, and then *3Com NIC Utilities.***

4 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostics General screen appears and displays following LEDs:

**Link**—lights if there is a valid connection between the NIC and the network.

**Transmit**—lights if the NIC is transmitting information.

**Receive**—lights if the NIC is receiving information.

**Duplex**—indicates if the NIC is transmitting data across the network in half-duplex mode (half the LED lights), or in full-duplex mode (the entire LED lights).

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## Accessing 3Com Support Databases

In addition to the 3Com support databases listed in this section, check the README.TXT files in the ENGLISH, INSTALLS, and NWSERVER subdirectories and check the Help text files located in the HELP directory on the *EtherCD*.

### Accessing the 3Com Knowledgebase

To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

`http://knowledgebase.3com.com`

### Accessing the 3Com NIC Help System

To access the 3Com NIC Help system:

1. **Make sure that the NIC, its driver, and the 3Com NIC Diagnostics program are installed.**

   See Installing the 3Com NIC Diagnostics Program on page 50 for instructions.

2. **Open the Windows *Start* menu.**
3. **Select *Programs*, and then *3Com NIC Utilities*.**
4. **Select *3Com NIC Doctor Help*.**

   The main Help screen appears.

5. **Click *Help Topics* to display a list of Help topics or click *Find* to search for a Help topic.**

### Accessing Release Notes and Frequently Asked Questions

To access release notes and frequently asked questions about the NIC:

1. **Make sure that the NIC, its driver, and the 3Com NIC Diagnostics program are installed.**

   See Installing the 3Com NIC Diagnostics Program on page 50 for instructions.

2. **Open the Windows *Start* menu.**
3. **Select *Programs*, and then *3Com NIC Utilities.***
4. **Click *3Com NIC Doctor.***

   The 3Com NIC Diagnostics General screen appears.

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5 **Click the Support tab.**

The Support screen appears.

6 ***Click Support Databases* to display customer support databases about the NIC in three categories:**

**Release notes**—Display tips about installing and using the NIC.

**Frequently asked questions**—Display common questions asked by customers and answered by 3Com support experts.

**Knowledgebase topics**—Display NIC compatibility topics.

## Troubleshooting the NIC Installation

If you encounter any of the following problems or error messages, follow the steps in Cleaning Up a Failed Installation on page 132 to resolve the problem.

### Problems/Error Messages

- A red X or a A yellow exclamation point (!) appears by the name of the NIC in the Windows Device Manager.
- The Network Neighborhood icon does not appear on the Windows desktop.
- The NIC does not appear in the Network Configuration or Properties window.
- Error: "This device is not present, not working properly, or does not have all of the driver installed. Code 22."
- Error: "Windows was unable to locate a driver for this device."
- Error: "You have selected a plug and play adapter. Please turn off your machine an install the adapter. Then turn on your machine and reinstall."

### Cleaning Up a Failed Installation

If the network driver installation failed, follow the steps below to clean up your system and install the NIC correctly.

This procedure:

- Removes all 3CR990 NICs from your system.
- Removes the 3Com NIC Diagnostics program.

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- Installs the latest network driver.

You can reinstall the 3Com NIC Diagnostics program after completing this procedure. See Installing the 3Com NIC Diagnostics Program on page 50 for instructions.

1 **Insert the *EtherCD* in the CD-ROM drive.**

The *EtherCD* Welcome screen appears.

2 **Click *Drivers*, and then click *Utilities*.**

3 **Click *Clean Up Failed Installation*.**

4 **Click *Proceed*.**

A warning message appears.

5 **Click *OK*.**

A message appears stating that all of the EtherLink NICs have been removed from your system.

6 **Click OK.**

7 **Exit the *EtherCD*, and then exit Windows.**

8 **Reboot the computer.**

9 **Install the network driver, as described in Installing the Network Driver Using the EtherCD on page 40.**

If you are prompted for 3Com files when Windows restarts, open the drop-down box and select the following path:

```
\options\cabs
```

To verify successful installation, see Verifying Successful Installation on page 48.

## Troubleshooting the Network Connection

If you encounter problems with using the NIC or connecting to the network, check the table below for troubleshooting tips.

***CAUTION:*** *Before inserting or removing the NIC from the computer, turn the computer power off and unplug the power cord.*

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| Tip | Description |
|---|---|
| Check the NIC hardware installation | ■ Make sure that the NIC is installed correctly in a PCI slot. Check for specific hardware problems, such as broken traces or loose or broken solder connections. See Installing and Connecting the NIC on page 34. |
| Check the NIC software installation | ■ Make sure that the NIC software is installed correctly in the computer. See Verifying Successful Installation on page 48. |
| Check the network connection | ■ Inspect all cables and connections. Make sure that the cable complies with length and rating specifications described in Installing and Connecting the NIC on page 34.<br>■ Examine the cable for obvious signs of damage, wear, or crimping. Substitute a known working cable. Check the length and rating of the cable. Make sure that the cable complies with 10BASE-T or 100BASE-TX recommendations. |
| Check the computer BIOS | ■ Make sure that you are running the latest BIOS for your computer. If the BIOS has not been upgraded in the previous 12 months, contact the computer manufacturer to obtain the current version of the BIOS software. |
| Run the NIC diagnostic tests | Run the NIC and Network Tests, as described in Running NIC Diagnostics on page 143.<br>If the tests fail, replace the NIC with a known working NIC and run the tests again, using the same configuration settings as those used on the failed NIC. If the working NIC passes all tests, the original NIC is probably defective. For information on product repair, see Technical Support on page 171. |
| Check the 3Com support databases | Review the known problems and solutions found in the following areas:<br>■ 3Com Knowledgebase<br>■ 3Com NIC Help system<br>■ Release Notes and Frequently Asked Questions<br>See Accessing 3Com Support Databases on page 131 for instructions on using these databases. |
| Download the latest NIC driver | The 3Com Software Library is your World Wide Web connection to software, drivers, and INF files for all 3Com products. Point your browser to the 3Com home page (http://www.3com.com/). Under Service and Support, click *Software, Drivers & INFs*. |
| Run the *Clean Up Failed Installation* program | The *Clean Up Failed Installation* program is located on the *EtherCD*. See Cleaning Up a Failed Installation on page 132 for instructions. |

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## Troubleshooting Remote Wake-Up

If your computer does not boot in response to a Remote Wake-Up event, perform these troubleshooting steps:

1 **Make sure that the computer meets the Remote Wake-Up Requirements on page 21.**

*Wake-On-Error is enabled by default.*

2 **Make sure that you are using the latest driver for the NIC.**

This driver is shipped with the NIC on the *EtherCD*. It can also be downloaded from the 3Com Software Library. Point your web browser to the 3Com home page:

`http://www.3com.com/`

Under Service and Support, click *Software, Drivers, and INFs*.

3 **Check the computer BIOS.**

- Boot the computer and enter the BIOS.
- For instructions on entering the BIOS, consult the computer documentation or contact the computer vendor.
- Locate the Wake-Up on LAN event setting.
- Verify that the setting is enabled.

4 **Check the Remote Wake-Up cable connection.**

If the computer complies with PCI 2.2, the Remote Wake-Up cable is not required. Remote Wake-Up is automatically enabled through the PCI bus.

- Turn off the power to the computer and remove the computer cover.
- Make sure that the Remote Wake-Up cable is plugged in to the RWU connector on the NIC and in to the appropriate connector on the computer motherboard. Unplug and reinsert the cable if necessary.
- Replace the Remote Wake-Up cable with a known functioning Remote Wake-Up cable and perform the Remote Wake-Up Test again.

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5 **If the previous steps have failed, install a known functioning Remote Wake-Up NIC in the computer.**

If Remote Wake-Up works with the new NIC installed, contact your computer vendor for a replacement NIC.

If Remote Wake-Up does not work with the new NIC installed, there may be a problem with the computer motherboard. Contact your computer manufacturer.

## Troubleshooting a Network Connection

When working with 10BASE-T or 100BASE-TX cabling, concentrators, and NICs from different vendors, it is possible to connect everything but still have no network communication.

*For additional network troubleshooting information, see Running NIC Diagnostics on page 143.*

To narrow the range of possible causes of common network connection problems:

1 **Determine whether your equipment complies with the 10BASE-T or 100BASE-TX standard.**

This is particularly important for data concentrators (hubs or repeaters).

2 **Connect a straight-through cable from the PC to the hub.**

The hub performs an internal crossover so that the signal can go from TD+ to RD+ and TD– to RD–. When you look at an RJ-45 connector from the front (that is, the opposite side from where the wires enter the connector), pin 1 is identified on the right side when the metal contacts are facing up.

3 **Make sure that the TD+ and TD– wires are twisted together, and that the RD+ and RD– are twisted together.**

Using wires from opposing pairs can cause signals to be lost.

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## Troubleshooting Hubs

A crossover cable can be used to identify the type of failure when hub performance or connectivity is in question.

To use a crossover cable:

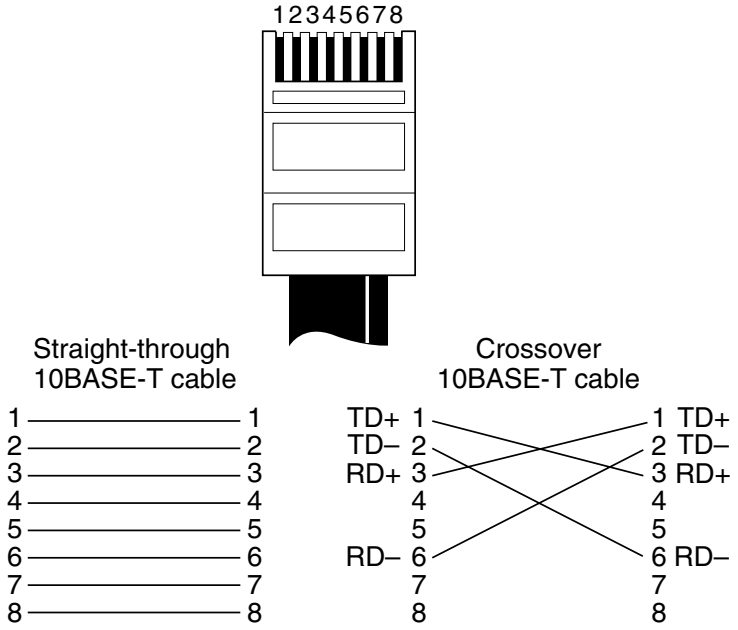
1 **Connect a file server and a client PC back-to-back with a crossover cable to verify that the NIC and network operating system are properly configured.**

2 **To make a crossover cable, connect TD+ to RD+ and TD– to RD–.**

The cable performs the crossover that is usually performed by the hub.

## Cabling Pinouts

The following illustration compares the cabling pinouts for straight-through and crossover cables.




If the file server and client PC function together as a small network, then either the existing cabling or the hub is failing.

When a crossover cable is used, the LED on the NIC functions differently than it would under normal operating conditions. For example, with a correct crossover connection, the LED lights, whereas with a straight-through connection, the LED does not light. If you make a crossover cable and the polarity

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is mismatched (that is, TD+ to RD– instead of TD+ to RD+), the LED blinks.

## Removing the Network Driver

To remove the network driver from your computer, follow the steps for your operating system.

### Windows 2000

The Windows 2000 system does not allow you to uninstall the network driver from the Network and Dial-up Connections window. To remove the network driver:

1. **Right-click the My Computer icon.**
2. **Select *Properties* on the pop-up menu.**

   The System Properties screen appears.
3. **Select the Hardware tab.**
4. **Click *Device Manager* in the middle panel.**

   The Device Manager screen appears.
5. **Double-click *Network Adapters*.**
6. **Right-click on the name of the NIC.**
7. **Select *Uninstall* on the pop-up menu.**

   A warning message appears.
8. **Click *OK* to confirm the driver removal.**

   The network driver is removed. The Device Manager screen appears.

*The Windows 2000 system does not allow you to uninstall the* DynamicAccess *technology miniport using the Device Manager. To remove* DynamicAccess *technology server features in Windows 2000, see* *Removing DynamicAccess Server Features on page 140.*

9. **Exit the Device Manager and shut down Windows.**

   If you want to physically remove the NIC from the computer, shut down the system, turn the power off, and remove the NIC from the computer.

   If you want to reinstall the NIC driver and software, restart the computer.

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## Windows NT 4.0

To remove the network driver:

1. **Double-click the My Computer icon, then the Control Panel icon, and then the Network icon.**

   The Network screen appears.

2. **Click the Adapters tab.**

3. **Highlight the name of the NIC in the Network Adapters box, and then click *Remove*.**

4. **Click *Yes* to confirm the removal.**

5. **Click *Close* to close the Network screen.**

   You are prompted to restart the computer.

   If you are physically removing the NIC from the computer, click *No*. Do not restart the computer until you shut down the system, turn the power off, and remove the NIC from the computer.

   If you are reinstalling the NIC software, click *Yes* to restart the computer.

## Windows 95 and Windows 98

To remove the network driver:

1. **Double-click the My Computer icon, then the Control Panel icon, and then the System icon.**

2. **Click the Device Manager tab.**

3. **Double-click *Network adapters*.**

4. **Highlight the name of the NIC.**

5. **Click *Remove*.**

6. **Click *OK* to confirm the device removal.**

*Note that removing the network driver does not result in the removal of the diagnostics software. See Removing the 3Com NIC Diagnostics Program on page 149.*

You are prompted to restart the computer.

If you are physically removing the NIC from the computer, click *No*. Do not restart the computer until you shut down the system, turn the power off, and remove the NIC from the computer.

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If you are reinstalling the NIC software, click *Yes* to restart the computer.

## Removing DynamicAccess Server Features

Follow the steps in this section to remove Dynamic*Access* technology server features for your operating system.

### Windows NT 4.0

To remove Dynamic*Access* technology server features:

1. **From the *Start* menu, select *Settings/Control Panel*.**
2. **Double-click the Network icon.**
3. **In the Network window, click the *Protocols* tab.**
4. **In the Protocols tab, select *DAPass Thru Driver Transport*.**
5. **Click *Remove*.**
6. **Follow the prompts to remove the software and reboot the server.**

### Windows 2000

The Windows 2000 system does not allow you to uninstall the Dynamic*Access* technology miniport using the Device Manager. To remove Dynamic*Access* technology server features:

1. **Launch the Windows 2000 Network and Dial-up Connections window.**
2. **Select a Local Area Connection icon.**
3. **Click the right mouse button and select *Properties* from the menu. The Local Area Connections Properties window appears.**
4. **Click the General tab.**
5. **In the General window, select Dynamic*Access* Protocol and click *Uninstall*.**

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## NetWare

To remove Dynamic*Access* technology server features:

1 **Enter this command at the prompt:**

```
NetWare 4.11: load install
NetWare 5.0: load nwconfig
```

2 **In the Installation Options screen, select *Product options*.**

3 **In the Other Installation Actions screen, select *View/Configure/Remove installed products*.**

The Currently Installed Products screen appears, listing software products that are installed in the system.

4 **From the list of products, select *3Com* Dynamic*Access Server Features* and press Del.**

**Select *Yes* to remove the software.**

*For instructions on removing the 3Com NIC Diagnostics Program from your computer, see Removing the 3Com NIC Diagnostics Program on page 149.*

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# 9 RUNNING NIC DIAGNOSTICS

## Overview

The EtherLink PCI NIC uses two types of NIC diagnostics programs: a Windows-based diagnostics program and a DOS-based diagnostics program.

*Before starting any diagnostics program, close all running applications.*

Use the Windows-based 3Com NIC Diagnostics program if you are running any of the following operating systems:

- Windows 2000
- Windows NT 4.0
- Windows 98
- Windows 95

Use the 3Com DOS Diagnostics program if you are running any of the following operating systems:

- DOS
- NetWare

*The following sections explain how to start both NIC diagnostics programs. However, specific instructions are provided only for using the Windows-based 3Com NIC Diagnostics program.*

This chapter explains how to:

- Run the NIC diagnostic tests.
- View the NIC LEDs in the NIC Diagnostics program.
- View network statistics.
- Use the 3Com icon in the Windows system tray.
- Remove the 3Com NIC Diagnostics program.

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## Running the 3Com DOS Diagnostics Program

To start the 3Com DOS diagnostics program for DOS and NetWare installations:

1 **Reboot the computer using a DOS-bootable diskette.**

***CAUTION:*** *If you are running Japanese DOS, you must switch to U.S. mode DOS before running the 3Com DOS diagnostics program*

*For more information about how to make a DOS-bootable diskette, see Making a DOS-Bootable Diskette on page 30.*

2 **Insert the *EtherCD* in the CD-ROM drive.**

3 **At the DOS prompt, enter the following command:**

```
d:\3c99xcfg.exe
```

where d:\ indicates the drive location of the *EtherCD*.

For more information about the 3Com DOS Diagnostics program to configure the NIC, see Using the 3Com DOS Configuration Program on page 118.

## Running the NIC Diagnostics Tests

The 3Com NIC Diagnostics program for Windows contains tests that can check the status of the following items:

- Network
- NIC

To run the NIC Test or Network Test:

1 **Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.**

2 **Open the Windows *Start* menu.**

3 **Select Programs, and then 3Com NIC Utilities.**

4 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostics screen appears.

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*Click Help to obtain general information about the function of a screen. To obtain specific information about any topic on a screen, click the question mark (?) in the upper right corner of the screen, move it over a topic, and click once.*

The following tabs are available for viewing NIC data:

| Tab | Description |
|---|---|
| General | Select the General tab to display the node address, I/O address, and device ID for the installed NIC. |
| Configuration | Select the Configuration tab to view and modify configuration settings for the installed NIC. |
| Statistics | Select the Statistics tab to view network traffic statistics about the installed NIC. |
| Diagnostics | Select the Diagnostics tab to access diagnostics tests that you can run on the installed NIC. |
| Support | Select the Support tab to access various 3Com customer support resources. |
| Flash Update | Select the Flash Update tab to update firmware for the installed NIC. |

**5 Select the Diagnostics tab.**

The Diagnostics screen appears.

## Running the Network Test

Run the Network Test to check the NIC connectivity to the network.

To successfully pass the Network Connectivity test, at least one of the following conditions must be met:

- A Windows client running on the same network. This client must have a successfully installed Windows diagnostics program that is currently not running.
- A NetWare server running on the same network.
- A DHCP server running on the same network.

A DNS server running on the same network with TCP/IP properties configured for the DNS server.

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To run the Network test:

1 **On the Diagnostics screen, click *Run Network Test*.**

The Network Connectivity Test screen appears.

2 **Click *Start*.**

If the test passes, the NIC connection to the network is functioning correctly.

3 **Click *Close*.**

If the test fails:

- Make sure that the NIC is properly connected to the network cable.
- Make sure that the hub or switch to which the NIC is connected is powered on.
- Make sure that the cable complies with the proper length and specifications for your network.

### Running the NIC Test

Run the NIC Test to check the physical components, connectors, and circuitry on the NIC.

1 **On the Diagnostics screen, click *Run NIC Test*.**

The NIC Test screen appears.

2 **Click *Perform NIC Test*.**

While the test is running, a progress bar indicates test progress.

If the test passes, the NIC is functioning correctly.

If the test fails, a message indicates the error type. Click *Help* in the error message screen to obtain more information.

3 **Click *Close*.**

## Viewing the NIC LEDs in the Diagnostics Program

To view the LEDs in the 3Com NIC Diagnostics program:

1 **Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.**

2 **Open the Windows *Start* menu.**

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3 **Select *Programs*, and then *3Com NIC Utilities.***

4 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostics General screen appears and displays following LEDs:

**Link**—lights if there is a valid connection between the NIC and the network.

**Transmit**—lights if the NIC is transmitting information.

**Receive**—lights if the NIC is receiving information.

**Duplex**—indicates if the NIC is transmitting data across the network in half-duplex mode (half the LED lights), or in full-duplex mode (the entire LED lights).

*For instructions on interpreting the 10 LNK, 100 LNK, and ACT NIC LEDs, see Interpreting the LEDs on page 129.*

## Viewing Network Statistics

To view statistical information about the network:

1 **Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.**

2 **Open the Windows *Start* menu.**

3 **Select *Programs*, and then *3Com NIC Utilities.***

4 **Click *3Com NIC Doctor.***

The 3Com NIC Diagnostics General screen appears.

5 **Click the Statistics tab.**

The Statistics screen appears.

The information is updated by the NIC driver every 5 seconds.

For a description of each statistic, click the question mark (?) in the upper right corner of the screen, drag it over a statistic and click once. A pop-up box appears, displaying information about the statistic.

6 **Click *OK* to exit the diagnostics program. To go to another diagnostics screen, click the associated tab.**

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## Using the 3Com Icon in the Windows System Tray

The 3Com icon, which can be enabled to appear in the Windows system tray, allows you to start the 3Com NIC Diagnostics program. It also allows you to view the NIC's link speed and number of frames sent and received.

### Enabling the Icon

To show the 3Com icon in the Windows system tray:

1. **Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.**
2. **Open the Windows *Start* menu.**
3. **Select *Programs*, and then *3Com NIC Utilities.***
4. **Click *3Com NIC Doctor.***

   The 3Com NIC Diagnostics General screen appears.
5. **On the General screen, select the check box next to *Show Icon in System Tray*.**
6. **Close the 3Com NIC Diagnostic program.**

   The NIC icon appears in the Windows system tray.

   When you double-click the icon, the 3Com NIC Diagnostics program starts.

### Displaying Network Statistics

When you drag the mouse pointer over the icon (but do not double-click the icon) a network statistics box appears, displaying the following information:

**Frames Sent and Received**—A count of the number of frames (packets) sent and received through the NIC since the last time statistics were reset.

**Link Speed**—The speed (10 Mbps or 100 Mbps) at which the NIC is connected to the network.

The information is updated each time you move your mouse pointer over the 3Com icon.

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## Removing the 3Com NIC Diagnostics Program

The 3Com NIC Diagnostics Program can be removed using the Add/Remove Programs Wizard in Windows, or by using the *EtherCD*.

For instructions on using the Add/Remove Programs Wizard in Windows, see your Windows documentation.

To remove the 3Com NIC Diagnostics program using the *EtherCD:*

1. **Start Windows.**
2. **Insert the *EtherCD* in the CD-ROM drive.**

   The *EtherCD* Welcome screen appears.
3. **Click *NIC Software*.**
4. **Click *NIC Drivers and Diagnostics.***
5. **Click *Installation Utilities*.**
6. **Click *Remove Diagnostics*.**
7. **Click *Proceed*, and then follow the prompts on the screen.**

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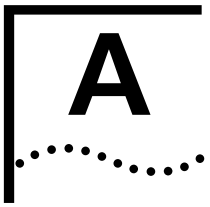

# OBTAINING DRIVERS

For a list of additional network drivers that are not included on the *EtherCD*, and instructions on how to install them, go to the following 3Com World Wide Web site:

http://support.3com.com/infodeli/tools/nic/

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# B SPECIFICATIONS AND CABLING REQUIREMENTS

This appendix lists the specifications, standards conformance, cable requirements, and connector pin assignments for the EtherLink 10/100 PCI NIC.

## 3CR990 NIC Specifications

The following table provides environmental, interface, and standards information for the EtherLink 10/100 PCI NIC with 3XP processor (3CR990 family).

### Hardware

| | |
|---|---|
| Memory | 128 KB external RAM |
| Bus interface | *PCI Local Bus Specification, Revision 2.2*<br>32-bit bus |
| PCI master | Supports bus master scatter-gather DMAs. |
| Dimensions | Length: 13.31 cm (5.24 in)<br>Height: 8.51 cm (3.35 in) |
| Power requirement | +5 V ±5% operating 1.26A maximum for normal operation (375 mA for low power mode) |

### Network Interface

| | |
|---|---|
| 10 Mbps Ethernet 10BASE-T | Ethernet IEEE 802.3 industry standard for a 10 Mbps baseband CSMA/CD local area network |
| 100 Mbps Ethernet 100BASE-TX | Ethernet IEEE 802.3u industry standard for a 100 Mbps baseband CSMA/CD local area network |

### Environment

| | |
|---|---|
| Operating temperature | 32˚ to 158˚ F (0˚ to 70˚ C) |
| Storage temperature | –22˚ to 194˚ F (–30˚ to 90˚ C) |
| Operating humidity | 10 to 90% noncondensing |
| Storage humidity | 10 to 90% noncondensing |
| Altitude | –984 ft to 9,840 ft (–300 to 3,000 m) |

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### Standards Conformance

IEEE 802.3x full-duplex, auto-negotiation, and flow control

IEEE 802.1p (General Attribute Registration protocol) for multicast addresses

Microsoft PC98

PCI 2.1 and 2.2

DMI 2.0 and 2.0s

ACPI 1.0

## Cabling Requirements

The cable, quality, distance, and connectors must comply with the Electronic Industries Association/Telecommunications Industries Association (EIA/TIA) 568 *Commercial Building Wiring Standard* and the Technical Services Bulletin TSB38 standards.

Network connection criteria are shown below.

| | |
|---|---|
| **NIC:** | 3CR990 family |
| **Cable:** | Category 3, 4, or 5 unshielded twisted pair |
| **Network cable connector:** | RJ-45 |
| **Transceiver:** | On-board |
| **Maximum Network Segment:** | 328 ft/100 m |
| **Speed:** | 10/100 Mbps |
| **Media Type:** | 10BASE-T<br>100BASE-TX |

### Twisted-Pair Cable

Twisted-pair cable consists of copper wires surrounded by an insulator. Two wires are twisted together (the twisting prevents interference problems) to form a pair, and the pair forms a circuit that can transmit data. A cable is a bundle of one or more twisted pairs surrounded by an insulator.

Unshielded twisted pair (UTP) is the most commonly used type of twisted-pair cable. Shielded twisted pair (STP) provides protection against crosstalk. Twisted-pair cable is now commonly used in Ethernet, Fast Ethernet, and other network topologies.

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The EIA/TIA defines five categories of unshielded twisted-pair cable.

| Category | Use |
|---|---|
| 1 | Traditional telephone cable. |
| 2 | Data transmissions up to 4 MHz. |
| 3 | Voice and data transmission up to 25 MHz. The cable typically has four pairs of wires. Category 3 is the most common type of installed cable found in older corporate wiring schemes. |
| 4 | Voice and data transmission up to 33 MHz. The cable normally has four pairs of wire. This grade of UTP is not common. |
| 5 | Voice and data transmission up to 125 MHz. The cable normally has four pairs of copper wire and three twists per foot. Category 5 UTP is the most popular cable used in new installations today. |

## 10BASE-T Operation

10BASE-T is the Institute of Electrical and Electronics Engineers (IEEE) 802.3 standard for Ethernet signaling over unshielded twisted-pair wire at 10 Mbps.

Ethernet, as the most widely used network protocol, uses 10BASE-T as its primary cabling scheme. Ethernet characteristics include:

- A data rate of 10 Mbps.
- A broadcast architecture.
- A specific media-access control (MAC) scheme.

The 10BASE-T name indicates a signaling speed of 10 Mbps and twisted-pair wiring. *Base* stands for baseband, which denotes a technique for transmitting signals as direct-current pulses rather than modulating them onto separate carrier frequencies.

A wiring topology using 10BASE-T specifies a wiring hub, cable arranged in a star configuration, and unshielded twisted-pair cable. Each node has a separate cable run that must not exceed 100 meters (328 ft) from the node to the hub.

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### 100BASE-TX Operation

100BASE-TX is the IEEE 802.3u standard for Fast Ethernet signaling over Category 5 UTP or STP wire at 100 Mbps.

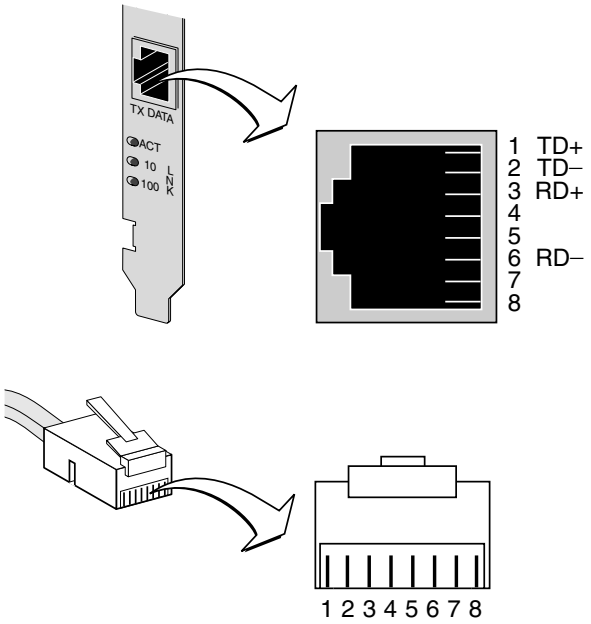
Based on an extension to the IEEE 802.3 Ethernet specification, Fast Ethernet characteristics include:

- A data rate of 100 Mbps.
- A broadcast architecture.
- A specific media-access control (MAC) scheme.

A wiring topology using 100BASE-TX specifies a wiring hub, cable arranged in a star configuration, and Category 5 UTP or STP wiring. Each node has a separate cable run that must not exceed 100 meters (328 ft) from the node to the hub.

## RJ-45 Connector Pin Assignments

The following illustration shows the RJ-45 connector pin assignments for the EtherLink PCI NICs.

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# Flow Control

The 3CR990 NICs utilize flow control technology to throttle the incoming data packet stream and prevent the loss of packets. IEEE 803.2x flow control prevents the input buffers of a device from overflowing. By using *pause frames* to communicate buffer status between linked transmitting and receiving devices (transmitters and receivers). A receiver sends a pause frame to tell a transmitter to stop the transmission of data frames for a specified period, allowing the receiver's input port buffers to empty before receiving new packets.

## Pause Frames

When a transmitter receives pause frames, it suspends transmission for the specified period. When the receiver's input buffers can store packets again, it can either send another pause frame to tell the transmitter to resume transmission, or wait for transmission to resume at the end of the specified period.

With *asymmetric* flow control, only one of two linked devices can receive pause frames. With *symmetric* flow control, both linked devices can send and receive pause frames.

## Link Negotiation

Related to flow control is the auto-negotiation capability, in which linked devices advertise their flow control capabilities and automatically select the best common mode of communication.

Rare cases (for example, linking to a device that does not support auto-negotiation) may require that auto-negotiation be disabled on a port, thereby enabling *forced link* on that port. When forced link is enabled, linked devices must have matching flow control capabilities. For example, a port that is set for forced link and reception flow control can connect successfully only with a port that is set for forced link and transmission flow control.

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# C INSTALLING THE 3COM DMI AGENT

## Overview

This appendix explains how to install the 3Com Desktop Management Interface (DMI) Agent on your PC.

The 3Com DMI Agent allows any DMI-compatible browser or network management application that supports DMI 2.0 to remotely manage and configure advanced features of an EtherLink PCI NIC.

*For detailed information on the 3Com DMI Agent, see the 3Com DMI Agent User Guide included with the 3Com DMI Agent software on the EtherCD.*

For more information on DMI, go to:

http://www.3com.com/managedpc

## About the 3Com DMI Agent

The 3Com DMI Agent allows you to obtain basic NIC information, including:

- Node address
- MAC address
- Driver version

Additionally, depending on the features of your NIC, the 3Com DMI Agent allows you to view and configure advanced NIC features, including:

- Managed PC Boot Agent (MBA) software
- Remote Wake-Up events
- Workgroup keep-alive packet
- Remote system alerts (including heartbeat)

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Each PC that contains an EtherLink NIC and the 3Com DMI Agent generates a Management Information Format (MIF) file that contains information about the PC and the NIC. DMI applications use the information from the MIF to manage the PC and the NIC.

The content of the MIF is based on the capabilities of the NIC driver found in the PC. For example, if a NIC with an MBA boot ROM is found, all groups related to the boot ROM are included in the MIF for that particular NIC. This ensures that the network management application does not receive irrelevant information for the NIC.

For a description of each MIF that is supported by the 3Com DMI Agent, see the *3Com DMI Agent User Guide* included with the 3Com DMI Agent software on the *EtherCD.*

## System Requirements

This section lists the client PC and network management requirements for installing and using the 3Com DMI Agent.

### Client PC Requirements

Your PC requires the following items to use the 3Com DMI Agent:

- DMI Service Provider 2.0 or greater (such as Smart Technologies Service Provider 2.0)
- NDIS 3, 4, or 5 driver
- Windows 2000, Windows NT 4.0, Windows 98, or Windows 95, using the appropriate Service Pack listed below:
  - Windows NT 4.0 Service Pack 4
  - Windows 98 Retail Release
  - Windows 95 Retail Service Pack 1 or OEM Service Release (OSR2)

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### Network Management Requirements

Your network management station requires a DMI-compatible browser or a network management application that supports DMI 2.0, such as:

- Hewlett Packard TopTools
- Tivoli Management Suite
- Dell OpenManage
- Compaq Insight Manager Management Station
- Intel LANDesk Client Manager

## Installing the 3Com DMI Agent

This section describes how to install the 3Com DMI Agent on a PC running Windows NT 4.0, Windows 98, or Windows 95.

*Before installing the DMI Agent, logon to the PC with an account that has system administration privileges.*

To install the 3Com DMI Agent:

1. **Make sure that the PC meets the requirements listed in Client PC Requirements on page 160.**
2. **Make sure that the EtherLink NIC is installed in the PC and is connected to the network.**
3. **Insert the *EtherCD* in the CD-ROM drive.**

   The *EtherCD* Welcome screen appears.
4. **Click *NIC Software*.**
5. **Click Dynamic*Access Technologies*.**
6. **Click *3Com DMI Agent*.**
7. **Follow the prompts on the screen.**

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**8 Restart the PC when prompted.**

To verify successful installation, use a DMI-compatible browser or a network management application that supports DMI 2.0 or 2.0s to verify that the 3Com NIC is present.

*If you have 3Com* Dynamic*Access software and a foreign (non-3Com) NIC installed, the foreign NIC is displayed as a 3Com NIC in the DMI browser.*

See the *3Com DMI Agent User Guide* or contact your system administrator for instructions.

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# D ETHERCD CONTENT AND NAVIGATION

## EtherCD Navigation

This section provides information about *EtherCD* content and navigation.

If auto insert is enabled for your CD-ROM drive, the 3Com Welcome screen is displayed when you insert the *EtherCD* in your CD-ROM drive.

If the Welcome screen is not displayed when you insert the *EtherCD* in your CD-ROM drive, you can:

- Enable the auto insert feature for your CD-ROM drive (see Auto Insert on page 164)

or

- Navigate to the root subdirectories (see Root Subdirectories on page 164)

The following table describes the navigation links available on the Welcome screen:

| Links | Description |
|---|---|
| User Guide | ■ Prints a PDF version of the user guide.<br>■ Copies the online version of the user guide to your desktop.<br>■ Views the user guide online with a web browser. |
| NIC Software | ■ Installs and configures the NIC in supported Windows operating systems.<br>■ Installs Dynamic*Access* technology.<br>■ Creates installation diskettes to install the NIC software in a PC that does not have a CD-ROM drive installed. |
| Other Software | ■ Installs Adobe Acrobat Reader (version 4.0 for English or version 3.0 for international). |
| Register Product | ■ Registers your NIC product online. |
| Release Notes | ■ Describes the features of 3CR990 NICs, includes frequently asked questions and known problems. |

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## Root Subdirectories

The following table lists and describes the root subdirectories included on the *EtherCD* that shipped with this product.

| Subdirectory | Description |
|---|---|
| English | Each language subdirectory contains files specific to that language. This subdirectory contains copies of Adobe Acrobat Reader (4.0 or 3.0), CMI Client installation files, the Disk Copy utility, PDF and HTML versions of the user guide, and a user guide for diskette installation only in PDF format. |
| Help | Installation and configuration files, basic troubleshooting, support information, and system resource information. |
| Installs | Contains images for Dynamic*Access*, MBA, and 3Com *EtherDisks*. |
| Ndis2 | Contains the DOS NDIS 2.x driver. |
| NWClient | Contains a DOS NetWare client driver file and runtime image file, a sample NET.CFG file, and an installer for the DOS ODI client driver. |
| NWServer | Contains a server driver, LDI import file, and appropriate .NLMs for loading into a NetWare 4.11 or 5.0 server. |

## Auto Insert

If auto insert is not enabled for your CD-ROM drive, the *EtherCD* Welcome screen is not displayed when you insert the *EtherCD* in your CD-ROM drive. To enable auto insert on your (Windows 9x) CD-ROM drive:

1. **Right-click the My Computer icon, and then select Properties.**
2. **Select the Device Manager tab.**
3. **Click the + symbol next to CD ROM in the list.**
4. **Select the name of your CD-ROM drive.**
5. **Click *Properties*, and then select the Settings tab.**
6. **Select the check box for Auto insert notification.**

   To view the Welcome screen on the CD navigator with auto insert enabled, reinsert the CD in the CD-ROM drive.

## Text Files

The following table lists the text files that are included in the Help directory on the *3Com EtherCD*.

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| File Name | File Description |
|---|---|
| client32.txt | Contains NetWare 4.11 on Windows 95/98 client driver installation notes. |
| license.txt | Includes the 3CR990 NIC software license agreement. |
| netware.txt | Explains how to install the ODI driver for the NetWare 4.1x and 5.0 server. You can also get NetWare installation instructions from README text files located in the following directories:<br>\nwserver\readme.txt (client)<br>\nwserver\readme_se.txt (server)<br>\english\diskcopy\disk2\nwserver\readme.txt (client)<br>\english\diskcopy\disk2\nwserver\readme_se.txt (server) |
| nwdosodi.txt | Explains how to install the driver for a 16-bit NetWare client running DOS. |
| register.txt | Explains why and how to register your NIC. |
| support.txt | Contains information about technical assistance services available from 3Com. |
| trouble.txt | Contains troubleshooting tips. |
| unt_nt4.txt | Explains how to perform an automated installation of Windows NT 4.0 over the network (unattended install). |
| unt_w98.txt | Explains how to perform an automated installation of Windows 98 over the network (unattended install). |
| w95ndis.txt | Provides instructions specific to Windows 95 for first-time installations, updating drivers, removing the NIC driver and *EtherCD* software, troubleshooting installation problems, and a peer-to-peer networking overview. |
| w95netwr.txt | Explains how to install the Windows 95 driver to support the Microsoft client for NetWare networks. |
| wakefaq.txt | Contains common questions and answers about Remote Wake-Up. |
| win2000.txt | Explains how to install the NIC, verify a successful installation, uninstall the NIC software, and update the driver. |
| win98.txt | Explains how to install the NIC, verify a successful installation, uninstall the NIC software, and update the driver. |
| winnt.txt | Provides installation instructions and troubleshooting tips for installing drivers in Windows NT 4.0. |

In addition to the Help directory, you can find general installation information and the latest release notes in the \INSTALLS\README.TXT file (or on *EtherDisk 1*, if you install from diskettes.

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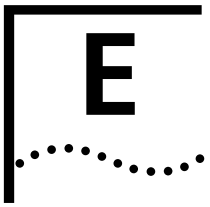

# INSTALLING A 3COM NIC WHILE INSTALLING THE NOS

Follow these instructions to install 3Com software while you are installing the network operating system. (This procedure is often called "performing a fresh installation.")

## Windows Fresh Installation

For installation requirements, see Installation Requirements on page 28.

To display the Help system during the driver installation, click *Help* on any 3Com window.

### Windows NT

For instructions, see the WINNT.TXT file in the HELP directory on the *EtherCD*.

### Windows 2000

During the Windows 2000 installation, the Hardware Wizard detects installed NICs and installs drivers it finds for them from the Windows 2000 CD. If you want to install the latest software from the 3Com EtherLink Server CD after you finish installing Windows 2000, restart the server and follow the instructions for Windows in Updating the Network Driver and NIC Software on page 51.

## NetWare Fresh Installation

These instructions apply to NetWare versions 4.11 and 5.0.

### Requirements

See Installation Requirements on page 28.

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## Installation Instructions

These instructions are for installing from the 3Com EtherLink Server NIC CD. If you download 3Com software from the Web and make installation diskettes to use for the installation, the steps are slightly different (you do not need to remove and replace the NetWare CD).

1. **Install the NIC hardware and connect it to the network.**
2. **Start the installation and proceed as usual until you reach the Device Types screen.**
3. **In the Device Types screen:**

   Locate the Network Boards field, and notice that there are no NICs listed. From the Options menu, select *Modify*.
4. **In the next screen, select Network Boards and press Enter.**
5. **Press Ins (Add a Board).**
6. **Press Ins (Add Unlisted Driver).**
7. **Remove the NetWare CD from the CD-ROM drive.**
8. **Insert the 3Com EtherLink Server CD in the CD-ROM drive.**
9. **Press F3.**
10. **Enter the location of the driver on the 3Com CD. For example:**

    **`D:\nwserver`**
11. **In the Driver Summary screen, select 3C990.LAN and press Enter.**

    Edit parameters as necessary.
12. **From the Additional Driver Options menu, select *Return to Driver Summary*.**
13. **Remove the 3Com CD from the CD-ROM drive.**
14. **Insert the NetWare CD in the CD-ROM drive.**

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**15 From the Options menu, select *Continue*.**

The installation continues.

In NetWare 5.0, the Configure Server Properties windows appear. Locate the Network Boards list in the Protocols window. The installed NICs are listed in this window. Select each installed NIC and configure its protocols. Proceed with the installation, and reboot when you are prompted to do so.

**16 When the installation is finished, edit the STARTUP.NCF file.**

Specify receive buffers for each installed NIC.

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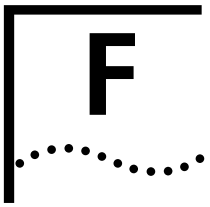

# TECHNICAL SUPPORT

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the most recent information, 3Com recommends that you access the 3Com Corporation World Wide Web site.

## Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Knowledgebase Web Services
- 3Com FTP site
- 3Com Bulletin Board Service (3Com BBS)
- 3Com Facts℠ Automated Fax Service

### World Wide Web Site

To access the latest networking information on the 3Com Corporation World Wide Web site enter this URL into your Internet browser:

`http://www.3com.com/`

This service provides access to online support information such as technical documentation and a software library, as well as support options that range from technical education to maintenance and professional services.

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## 3Com Knowledgebase Web Services

This interactive tool contains technical product information compiled by 3Com expert technical engineers around the globe. Located on the World Wide Web at http://knowledgebase.3com.com, this service gives all 3Com customers and partners complementary, round-the-clock access to technical information on most 3Com products.

## 3Com FTP Site

Download drivers, patches, software, and MIBs across the Internet from the 3Com public FTP site. This service is available 24 hours a day, 7 days a week.

To connect to the 3Com FTP site, enter the following information into your FTP client:

- Hostname: **ftp.3com.com**
- Username: **anonymous**
- Password: **<your Internet e-mail address>**

*You do not need a user name and password with Web browser software such as Netscape Navigator and Internet Explorer.*

## 3Com Bulletin Board Service

The 3Com BBS contains patches, software, and drivers for 3Com products. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

### Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

| Country (Region) | Data Rate | Telephone Number |
|---|---|---|
| Australia | Up to 14,400 bps | 61 2 9955 2073 |
| Brazil | Up to 28,800 bps | 55 11 5181 9666 |
| France | Up to 14,400 bps | 33 1 6986 6954 |
| Germany | Up to 28,800 bps | 4989 62732 188 |

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| Country (Region) | Data Rate | Telephone Number |
|---|---|---|
| Hong Kong | Up to 14,400 bps | 852 2537 5601 |
| Italy | Up to 14,400 bps | 39 2 27300680 |
| Japan | Up to 14,400 bps | 81 3 5977 7977 |
| Mexico | Up to 28,800 bps | 52 5 520 7835 |
| P.R. of China | Up to 14,400 bps | 86 10 684 92351 |
| Taiwan | Up to 14,400 bps | 886 2 377 5840 |
| U.K. | Up to 28,800 bps | 44 1442 438278 |
| U.S.A. | Up to 53,333 bps | 1 847 262 6000 |

### Access by Digital Modem

ISDN users can dial in to the 3Com BBS using a digital modem for fast access up to 64 Kbps. To access the 3Com BBS using ISDN, call the following number:

**1 847 262 6000**

## 3Com Facts Automated Fax Service

The 3Com Facts automated fax service provides technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3Com Facts using your Touch-Tone telephone:

**1 408 727 7021**

# Support from Your Network Supplier

If you require additional assistance, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

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If you are unable to contact your network supplier, see the following section on how to contact 3Com.

## Support from 3Com

If you are unable to obtain assistance from the 3Com online technical resources or from your network supplier, 3Com offers technical telephone support services. To find out more about your support options, call the 3Com technical telephone support phone number at the location nearest you.

When you contact 3Com for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

Here is a list of worldwide technical telephone support numbers:

| Country (Region) | Telephone Number |
|---|---|
| **Asia Pacific Rim** | |
| Australia | 1 800 678 515 |
| Hong Kong | 800 933 486 |
| India | +61 2 9937 5085 |
| Indonesia | 001 800 61 009 |
| Japan | 0031 61 6439 |
| Malaysia | 1800 801 777 |
| New Zealand | 0800 446 398 |
| Pakistan | +61 2 9937 5085 |
| Philippines | 1235 61 266 2602 |
| P.R. of China | 10800 61 00137 or 021 6350 1590 |
| Singapore | 800 6161 463 |
| S. Korea | |
| From anywhere in S. Korea: | 00798 611 2230 |
| From Seoul: | (0)2 3455 6455 |
| Taiwan | 0080 611 261 |
| Thailand | 001 800 611 2000 |
| **Europe** | |
| From anywhere in Europe, call: | +31 (0)30 6029900 phone<br>+31 (0)30 6029999 fax |

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| Country (Region) | Telephone Number |
|---|---|
| **Europe, South Africa, and Middle East** | |
| From the following countries, you may use the toll-free numbers: | |
| Austria | 0800 297468 |
| Belgium | 0800 71429 |
| Denmark | 800 17309 |
| Finland | 0800 113153 |
| France | 0800 917959 |
| Germany | 0800 1821502 |
| Hungary | 00800 12813 |
| Ireland | 1800 553117 |
| Israel | 1800 9453794 |
| Italy | 1678 79489 |
| Netherlands | 0800 0227788 |
| Norway | 800 11376 |
| Poland | 00800 3111206 |
| Portugal | 0800 831416 |
| South Africa | 0800 995014 |
| Spain | 900 983125 |
| Sweden | 020 795482 |
| Switzerland | 0800 55 3072 |
| U.K. | 0800 966197 |
| **Latin America** | |
| Argentina | AT&T +800 666 5065 |
| Brazil | 0800 13 3266 |
| Chile | 1230 020 0645 |
| Colombia | 98012 2127 |
| Mexico | 01 800 CARE (01 800 2273) |
| Peru | AT&T +800 666 5065 |
| Puerto Rico | 800 666 5065 |
| Venezuela | AT&T +800 666 5065 |
| **North America** | 1-800-527-8677 |

## Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain an authorization number. Products sent to 3Com without authorization numbers will be returned to the sender unopened, at the sender's expense.

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To obtain an authorization number, call or fax:

| Country (Region) | Telephone Number | Fax Number |
|---|---|---|
| Asia, Pacific Rim | +65 543 6500 | +65 543 6348 |
| Europe, South Africa, and Middle East | +31 30 6029900 | +31 30 6029999 |
| Latin America | 1 408 326 2927 | 1 408 326 3355 |
| From the following countries, you may call the toll-free numbers; select option 2 and then option 2: | | |
| Austria | 0800 297468 | |
| Belgium | 0800 71429 | |
| Denmark | 800 17309 | |
| Finland | 0800 113153 | |
| France | 0800 917959 | |
| Germany | 0800 1821502 | |
| Hungary | 00800 12813 | |
| Ireland | 1800553117 | |
| Israel | 1800 9453794 | |
| Italy | 1678 79489 | |
| Netherlands | 0800 0227788 | |
| Norway | 800 11376 | |
| Poland | 00800 3111206 | |
| Portugal | 0800 831416 | |
| South Africa | 0800 995014 | |
| Spain | 900 983125 | |
| Sweden | 020 795482 | |
| Switzerland | 0800 55 3072 | |
| U.K. | 0800 966197 | |
| U.S.A. and Canada | 1-800-527-8677 | 1 408 326 7120 |

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2 This device must accept any interference received, including interference that may cause undesired operation.

**WARNING:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

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*The Interference Handbook*

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

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